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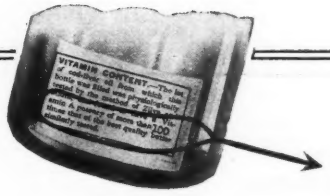

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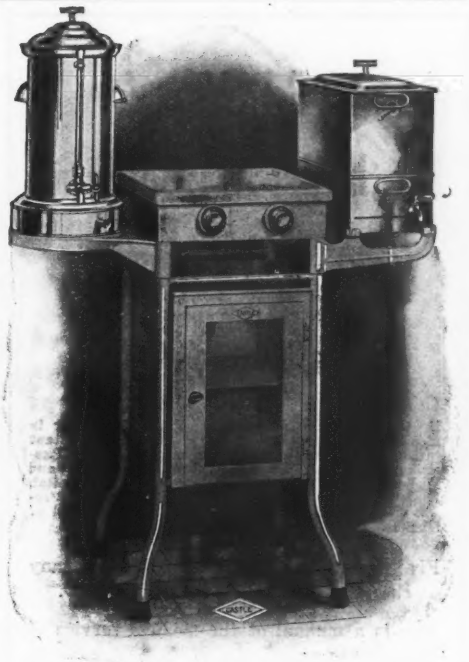

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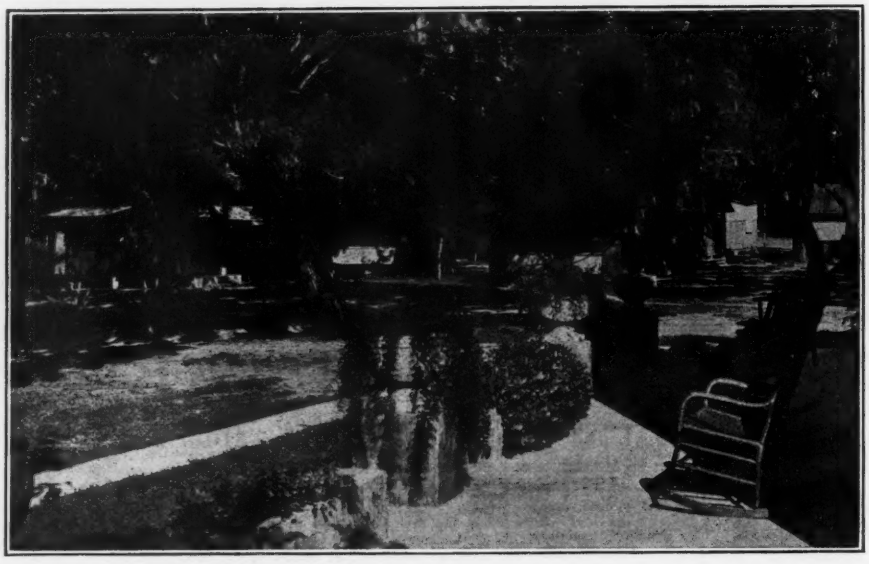

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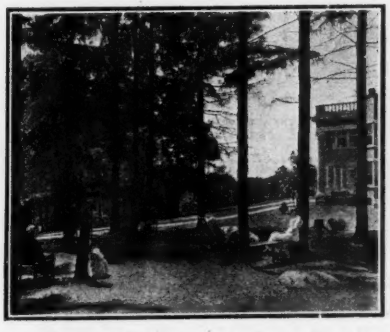

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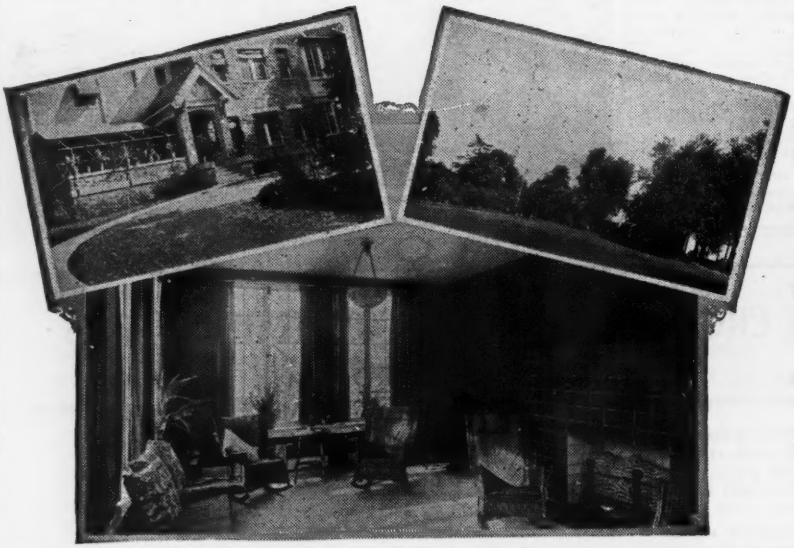

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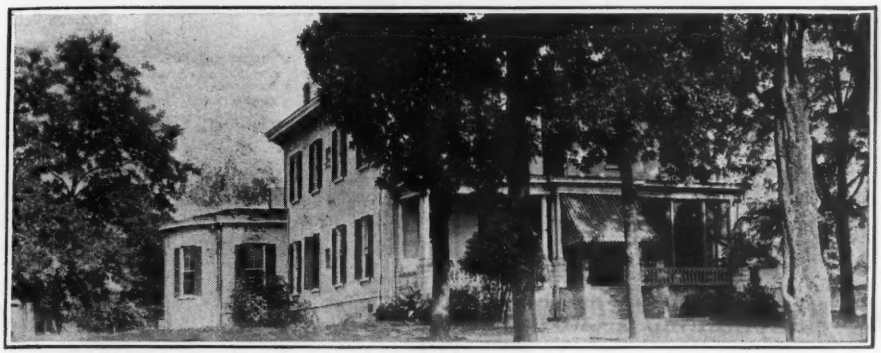

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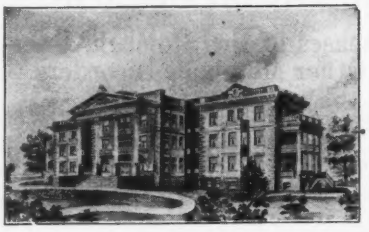

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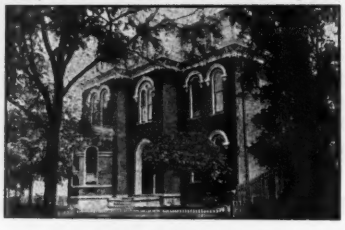

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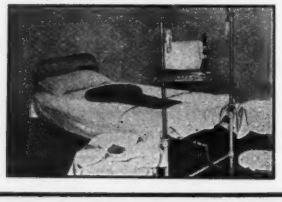

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MEDICINE

INTERNAL DISEASES, PEDIATRICS, NEUROLOGY, DIAGNOSTIC METHODS, ETC.

SOME MILDER FORMS OF DIABETES WITH SPECIAL REFERENCE TO MILD DIABETES IN ELDERLY PERSONS WITH ARTERIOSCLEROSIS*

By R. T. WOODYATT, M.D.,
Chicago, Ill.

In these days of insulin and unprecedented interest in diabetes, when much has been written and said about coma and the severer cases, it may not seem amiss to speak for a few moments on another phase of the diabetic problem, one of special importance to the practicing physician, but also, I think, not devoid of theoretical interest. I refer to some of the milder forms of diabetes and in particular to the management of elderly individuals with arterial disease and a mild diabetes.

Elderly people with arteriosclerosis, like people of all other ages, may of course show different types of diabetes. The fact that a patient is elderly and that he has advanced changes in the blood vessels does not by itself fix the type of diabetes that he may have. But in elderly people with arterial disease there is a type of diabetes which recurs with great frequency, and it is to this type that I refer. The patients may be men or women, but are more often men. They are usually in the fifties or sixties when recognized as belonging to this group, but they may give a history of glycosuria extending back to the forty-fifth year, even to the fortieth year of life, possibly in an exceptional case even into the late thirties. If the onset is in the early forties and if the case is seen at that time it may not be possible to recognize it as one destined to run a slow, mild course. However, when seen later in the light of past events it may be perfectly apparent that the case was characterized from the beginning by inherent mildness and by a tendency to progress in severity very slowly or not at all in spite of laxnesses of treatment or flagrant abuses that would inevitably make anything but an inherently mild case permanently more severe. Patients of the type to which we refer when they present themselves for treatment may have no symptoms of diabetes whatsoever except glycosuria. They may be feeling well and vigorous and be in a good state of nutrition. They may be overnourished. They may seek advice simply because they have been told that their urine shows sugar, and that they must seek advice. Others again may have, or may have had, certain symptoms of a type referable simply to an excess of sugar in the tissues, blood and urine, symptoms such as polyuria, thirst, fatigability, mental dulling, somnolence after meals, dimness of vision of the sort that results purely from changes in refraction, a balanitis, an intertrigo or the like. But these symptoms only occur as a rule when the patient is indulging rather freely at table.

*Read in Section on Medicine, Southern Medical Association, Seventeenth Annual Meeting, Washington, D. C., Nov. 12-15, 1923.

Also some of these patients may have symptoms of another type, referable directly to their arterial disease or to degenerative changes in the nervous system, symptoms that are not due directly to the well known metabolic anomaly that characterizes diabetes. We need not enumerate these symptoms, as everyone knows the group. It includes intermittent claudication, cramps in the muscles, gangrene, retinitis, loss of the knee jerks, perforating ulcers, polyneuritis, and so on. On the other hand, patients of the group to which we refer do not as a rule show the characteristic symptoms which result from an inability on the part of the body to *burn* enough glucose. They do not show severe acidosis or undernutrition except under certain special circumstances. It is of course true that an inherently mild case of diabetes in an older patient may be seen in a state of undernutrition, but if the case is in reality inherently mild the undernutrition will be due to the treatment imposed or to some factor other than the diabetes and not to the inability of the patient to use enough food to nourish him. It is also true that one may see one of these patients at times under the influence of an acute infection or under a nervous or emotional strain which is capable of temporarily depressing the glucose using power below the level that is characteristic for that case under ordinary conditions. The mild diabetes may then be fanned into a fury and the patient may develop a high acidosis. However, with proper management and the passing of the deleterious influence the case may resume its former mildness, little the worse for the aggravation.

Cases of the type in question fall into two classes. There are those in which it is a very simple matter to make the urine sugar free and to keep it so without much annoyance to the patient and without reducing the diet to the point of weakening him. There are others in which in order to keep the urine sugar free the diet has to be depressed to a level so low as to impair strength and cause disability. Now when the disease itself is not disabling the patient and when in order to make the urine sugar free it is necessary to limit the diet so much that it will disable the patient in a week or two then it behooves us to pause and think. For if a doctor causes more disability in a week or two than the diabetes has caused in a year or two, he is 52 times worse than the diabetes from the patient's viewpoint. Before doing this he should be sure that what he will gain for the patient in the future by keeping the urine sugar free at the cost of immediate disability will repay what is certainly lost for him now, and before he undertakes the responsibility of disabling a man he must have very clear reasons for doing it. He will not do it on the basis of theory alone or of opinion unaccompanied by concrete evidence. Some patients have such confidence in the profession that they prefer to be disabled on a scientific regime rather than to be well and happy under a quack. But most patients are not so intelligent as this, and if the profession insists upon a disabling course of treatment unnecessarily they are prone to go outside of the profession for advice. I gain the impression that a mistake sometimes made lies in a failure to discriminate between cases that can and should be kept sugar free and those which it is unnecessary or even harmful to manage in this way, and this raises the question of how we may discriminate between cases that should, and those that should not, be kept sugar free at all costs. With your permission I shall continue the discussion of this question by means of illustrative cases.

Case I.—The patient was a doctor 69 years old. He was 5 ft. 11¾ in. tall, and weighed on admission 154 lbs. The arteries showed marked alterations. The urine showed sugar, but no acetone bodies. Twelve years previously, at the age of 57, he was under some nervous stress and fell in body weight from 218 to 180 lbs. Examining his urine he found sugar, and he has had glycosuria practically all the time since, but it is not apparent that the loss of glucose calories in the urine was ever very great or enough to cause a loss of weight. In the beginning he could make the sugar disappear by adhering to a low diet, but the diet necessary to keep the urine sugar free was so low that it weakened him and he could not on that diet carry on his professional work. So he took more food and was able to work, although he then had some sugar in the urine. He lived the life of a diabetic from then on and always kept his diet as low as he practically could. During the following 11 years his weight remained in the neighborhood of 176 lbs. During the preceding year it had fallen to 154. He said that physically he was about 50 per cent efficient. He came in for insulin treatment, hop-

ing that it might enable him to take more food and have more strength to work.

The following are the important points in the history:

(1) The glycosuria was discovered at 57. The great preponderance of all cases beginning at this age proves subsequently to be of a mild type, and from the age when the symptoms began we should rather expect *a priori* that the case would be mild.

(2) Since the beginning there had been no symptoms distinctive of diabetes except glycosuria. The loss of weight would be explainable with or without diabetes if the diet was as low as the patient said it was, and there was no positive evidence in the history to prove that the diabetes itself had caused undernutrition with the patient on a liberal diet. It is true that he lost weight before he dieted, but he was under a nervous strain and he may not have eaten his usual amount of food.

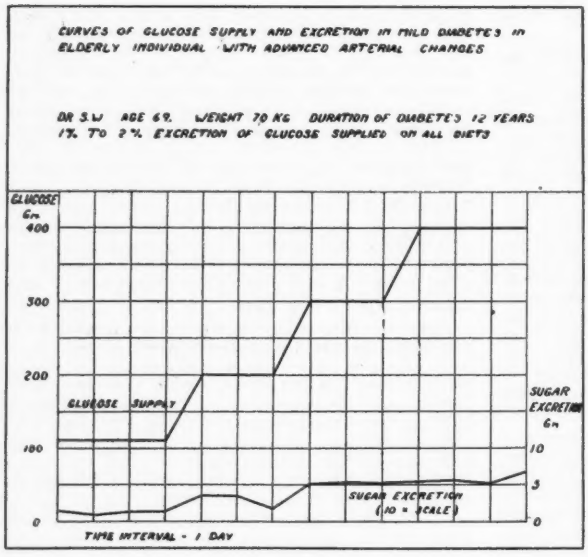
(3) The patient said he had felt better and stronger when, after desugarizing, he had taken more food, even though it caused a recurrence of glycosuria. He would probably not have reacted in this way unless he had been able to utilize some at least of the extra food that he took, suggesting that on the low diet he was not receiving all the food he was able to utilize.

(4) The diabetes existed 12 years in spite of the fact that during this time the urine contained sugar practically all of the time. No really severe diabetes could have continued so long as this under such conditions. Had the diabetes been severe it would long ago have declared itself in no mistakable terms. And this confirms what might have been expected in the first place.

(5) On admission the patient weighed 154 lbs. For a man 5 ft. 11¾ in. tall and large in frame this was decidedly a low weight. A year before and for the 10 preceding years he had weighed always in the neighborhood of 176 lbs., and the loss of weight during the previous year was not coincident with the appearance of new symptoms suggesting a severer diabetes. He did not develop polyuria, thirst or acidosis. But during the preceding year he was under a stricter dietary management and had taken less food, not because forced to do so physically by his diabetes, but because reading and reasoning and advice led him to take this action in order to forestall hypothetical future troubles that at this time existed only in his mind. Consequently we are inclined to discount the significance of this latest weight loss and to doubt that it could be due to the diabetes; for even if the diabetes had become more severe in the preceding year after having remained almost stationary for 11 years we should still be inclined to suspect that the aggravation would be temporary. Long standing cases of this type may in the course of years gradually grow worse, but it would be very unusual to see one become suddenly and permanently more severe without a complicating factor after 10 years of station. At any rate on admission the patient was still able to hold a body weight of 154 lbs. or 70 kg. The body weight in kilograms times 30 gives 2100 as the number of calories required at light work to maintain this weight for a day, and the calories, divided by 17, gives roughly the least number of grams of glucose that must be burned by the average patient in order to produce the calories without using enough fat to cause acetonuria. So we know that this patient must have the power to burn some 123 grams of glucose at the minimum, and of course we suspect that he may be able to do much more. Furthermore, he is able to do this now after having had his diabetes for 12 years, during 11 of which he weighed always in the neighborhood of 176 lbs. and in spite of the fact that he showed sugar in the urine most of the time. Clearly he must have had and probably still has a high and durable sugar using power.

Starting with this knowledge, it might seem probable that if the patient were placed on a well balanced ration with a glucose value materially below 123 the urine would become sugar free, so he was placed on a trial diet with G at 110 grams as shown on the table. But the glycosuria did not wholly disappear or show any falling tendency in three days. Feeling convinced that he must be able to burn at least 123 grams of glucose and anticipating a much higher power still, we found that on a supply of but 110 grams he still excreted 1.0 gm. of sugar instead of 400 to 700 mg. as would be the case with a normal person (see Chart I). So on this diet the patient is using but 109 grams. This diet is so low that it will cause a further loss in weight and strength. The patient was undernourished and 50 per cent disabled when he entered. He came to get more food and strength, not less. He had asked for insulin, and in view of these findings one might be inclined to use insulin at this stage. But these findings would imply that the case was severe, for even a fairly severe case of diabetes may burn 109 grams of glucose, and this conflicts with everything in the history of this case, which had led us to conclude that the diabetes was mild.

In cases of this sort where there appear to be discrepancies between the laboratory data on the one hand and the clinical facts and common sense on the other, we have found it useful to place the patient on a series of diets with glucose values rising in steps of say, 25 to 50 or 100 grams. In this case the patient, having been placed for three days on the diet with G at 110, was then placed for three days on a diet with G at 200, and later on diets with G at 300 and 400 grams respectively in order to test the sugar using function on different supplies. When the excretion on a given diet becomes virtually constant (and in this case it did so at once on each of the diets given), the average for each of the several periods is plotted to give a curve. And by a study of the excretion curve we obtain valuable information. The curve is a curve of excretion, but the difference between the supply curve and the excretion curve is a curve of utilization. In this case it will be seen that as the glucose supply was increased stepwise from 110 to 400 grams the excretion rose but little, and that with each rate of supply almost exactly the same percentage of the supply was excreted, that is, about 4 per cent of 110, 4 per cent of 200, and so on.



Case I Chart

METABOLIC FINDINGS IN PATIENT WITH ADVANCED ARTERIAL CHANGES AND DIABETES OF LONG STANDING

DR S.W

		DIET					URINE					
								SUGAR				
DATE	KG. WEIGHT	C	P	F	G	CAL.	VOLUME	DAILY	AVERAGE	N	N÷6.25	REMARKS
10-18	71.0	64	53	140	110	1728	2040	1.17				Bl. Sug.-0.13
19		"	"	"	"	"	1230	0.78		9.4	58.7	
20	68.6	"	"	"	"	"	1230	1.03				
21		"	"	"	"	"	2100	1.07	1.01			Excr. 1.0% of Supply
22		154	55	137	200	2066	1400	3.55		6.1		
23		"	"	"	"	"	1300	3.44				Excr. 1.9% of Supply
24	70.0	"	"	"	"	"	1000	1.63	2.88	8.5	45.6	Bl. Sug.-0.15
25		236	59	86	300	2034	1900	5.07		5.5		
26		"	"	"	"	"	2400	5.20		8.3		Excr. 1.7% of Supply
27	69.0	"	"	"	"	"	1660	5.10	5.12	8.1	45.6	Bl. Sug.-0.15
28		336	59	86	400	2434	2440	+				Dextro-rotatory
29		"	"	"	"	"	2300	5.72		6.3		Excr. 1.4% of Supply
30		"	"	"	"	"	1700	5.32	5.52	8.3	45.6	Bl. Sug.-0.13
31	70.0	"	"	"	"	"	1880	6.89		7.9		Bl. Sug. 11 A.M.-0.15 Insulin 10 Units

Case I Table

With this added information the discrepancy between the laboratory data and the clinical history comes to an end and the laboratory proves the case to be mild, as the history indicated it must be, for an individual who can on demand utilize 394 grams of glucose approaches the normal in respect of his sugar using power even if he does prefer to waste a little sugar in the urine. He must be able to produce daily the amount of insulin necessary for the utilization of as many grams of glucose as this. If we say, for instance, that 1 unit of insulin may be necessary in a given case for the oxidation of 2 grams of glucose, then this patient must be able to produce from his own islets some 200 units of insulin daily. (For without insulin glucose is not utilized, so far as we know). So the patient after 12 years of diabetes, 12 years of uncontrolled glycosuria, preserves this high insulin producing power. Yet in spite of it all, he shows an abnormal amount of sugar in the urine on any practical diet. On the low diet he is 50 per cent disabled. On a diet with a glucose value of 150 to 200 he is comfortable and strong, not disabled. The blood sugar percentage is a trifle above the normal average on the higher diet, but also on the lower. It is about the same on both. He has no polyuria or thirst on either. He is 69 years old, and by his arteries older yet. What difference does it make to this elderly gentleman whether his urine when placed in a blue solution turns the blue solution red or leaves it blue? Surely he should not be disabled merely for that reason. He has no esthetic preference for blue as a color. As a matter of fact, as he says, in his earlier days he was inclined to favor the red. But after all, even if his urine is kept sugar free, will it make his calcified arteries young again?

But the gentleman came in for insulin treatment and was slightly disappointed not to have it. It might be thought that in a case of this kind it would require so little insulin to make the urine sugar free that there would be no reason why we should quibble over this detail. As a matter of fact, it happens very often in this type of case that a little insulin will not make the urine normally sugar free. In this case insulin was tried, as shown at the end of the chart. Twice as much was administered as might be necessary to remove the same number of grams of sugar from the urine of an ordinary severe case. But there was no lessening of the glycosuria. It so happened that the glycosuria actually ran a little higher on the insulin days. In most of our cases of this type we have found that insulin has had remarkably little effect per unit given and that the behavior in this respect may be characteristic and significant.

This patient was discharged on a diet with a glucose value of 160 to 180 that would easily yield all the calories needed for his comfort and permit of an increase in weight and strength. No further attempt was made to keep the urine sugar free, but to insure him against any possible error of judgment he was asked to submit

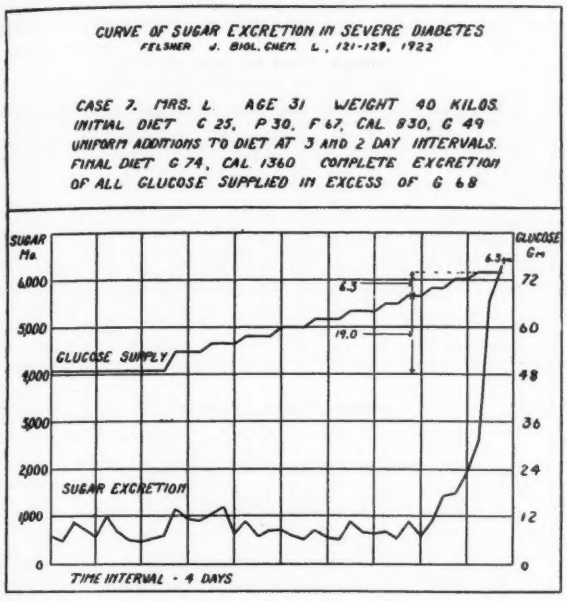


Chart 2

monthly specimens for a year. I believe a large part of the trouble and disability endured by this patient in the 12 preceding years was unnecessary. Had he succeeded in keeping the urine sugar free, or had he lessened his body weight more, his good tolerance in the end might have been interpreted as a triumph of treatment, but he failed to keep his urine sugar free and for 11 years he weighed 176 lbs., all of which would seem to prove that the disease itself was inherently mild and non-progressive throughout.

Case II.—In contrast with the excretion curve contained in this case is the curve obtained in a case of genuinely severe diabetes in a woman of 31 shown in Chart 2. This curve is typical of those obtainable in cases of severe diabetes in young people.

The lower serrated line shows the total excretion of sugar by days as measured in milligrams by the Benedict-Osterberg method. The upper terraced line shows the glucose value of the diet ascending stepwise at intervals of three days. In this instance each step represented an addition to the diet of a small uniform quantity of a milk-cream mixture that increased each time the glucose value of the diet by 5 grams. On the initial diet level the urine was sugar free to the qualitative tests with daily excretions below 1000 mg. Each increase of the diet caused the urinary sugar for the first day to rise a trifle, but the initial rise was followed always by a return to the former level on the days following. It will be noticed that as the G of the diet was worked upward 19 grams there was no permanent rise in the output of sugar. On the contrary, it actually settled to a level somewhat below the initial level. Then with one of the regular additions to the diet came an increase that was not followed by a restoration of levels on the following day, a warning. The next addition shot the excretion upward and was almost quantitatively excreted. This chart is one of those that appeared in Miss Felsher's report on tolerance limits in severe diabetes. It will be noticed that in this case the excretion and utilization appear to be normal up to a certain level. The insulin supply is capable of rising with the glucose supply as in health up to a certain point. But apparently that is nearly as high as it can go. The patient uses up to 65 grams of glucose with normal completeness. If more is given little if any more is used, a very different phenomenon from that shown by Case I, who used more and more glucose the more he was given (up to 400 grams).

Case III.—Chart 3 shows a curve obtained in the case of an elderly woman who it was thought might possibly prove to be a case of the same type as Case I, but it will be noted that the sugar excretion was normal with the G of the diet below 120 and that the curve broke rapidly upward when the supply exceeded 120. The behavior was like that of Case II and unlike that of Case I. Although this case could easily be held sugar free without insulin, she was a working woman and was partly disabled on the lower diet, so her food was increased somewhat with the assistance of insulin to give her a diet with a "G" of 140.

Cases IV and V.—Charts 4 and 5 show curves obtained in a series of cases of the type which is commonly called renal diabetes or renal glycosuria. They closely resemble the curve of the first case, but all of these latter curves were obtained with younger people. These cases also show no effect from insulin. The blood sugar percentages were low, differing in this respect from the type of case illustrated by Case I. Some years ago S. Strouse, of Chicago, pointed out that with his cases of renal glycosuria gross changes in the magnitude of the diet caused relatively little change in the glycosuria, much less in fact than would be shown by cases of typical diabetes. He emphasized this as a characteristic feature of these cases. The curves presented illustrate this point very clearly, and give the phenomenon a quantitative expression.

COMMENTS AND INTERPRETATION

The cases described in the foregoing are all of known types. The disease presented by Case I has been described in the literature, but is not so often recognized

METABOLIC FINDINGS IN CASE OF MODERATELY SEVERE DIABETES WITH ARTERIAL CHANGES

MRS. D. H.

DATE	KG WEIGHT	DIET C	P	F	"G"	CAL.	URINE SUGAR	REMARKS
8-23 to 27	52 6	20	33	105	50	1157	0 77	Bl. Sug. -0.22
10- 6 to 8	52 8	58	50	135	100	1647	0 77	
9- 7 to 11	52 7	74	50	165	120	1981	2 68	Bl. Sug. -0.26
9- 12 to 22	53 8	90	58	202	150	2450	12 67	Bl. Sug. -0.31
9- 23 to 28	54 0	149	58	178	200	2342	34 80	Bl. Sug. -0.37
9- 29 to 30	54.0	198	59	178	250	2542	60.80	

SUMMARIZED MANAGEMENT OF CASE

9- 30 to 10- 5	52.6	20	33	105	50	1157	0.79	
10- 6 to 8	52 9	58	50	135	100	1647	0 77	
10- 9 to 11	52.9	71	59	155	117	1901	1.50	
10- 12 to 18	54 4	"	"	"	"	"	0.56	Insulin 10 U.
10- 19 to 24	54.4	81	54	179	133	2081	0.59	" "
10- 25 to 28	55 0	84	57	188	141	2217	0.87	" "

FURTHER STUDY OF DATA OBTAINED

SUPPLY "G"	EXCRETION	UTILIZATION "T"	SUPPLY INCREMENT	EXCRETION INCREMENT	% OF "G" INCREMENT EXCRETED
50	0	50			
100	0	100	50	0	0
120	3	117	20	3	15%
150	13	137	30	10	33%
200	35	165	50	22	44%
250	61	189	50	26	52%

CURVES OF DATA OBTAINED

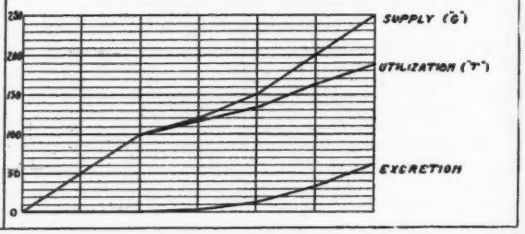


Chart 8

as the others, and the differential diagnosis has been less clearly established. It is representative of a group in which there is a close resemblance to the so-called renal diabetes or renal glycosuria, but in which the blood sugar percentages run above the normal average, rather than below it. In some of our cases of this group the blood sugar percentages have run much higher than those recorded in Case I. The report illustrates a method of study, a procedure in some respects new. The method consists in subjecting the body to a series of glucose supplies, rising or falling as a straight line, the individual being kept on each of a succession of diets for three or more days, during which the 24-hour outputs of sugar are measured by the Benedict-Osterberg or Folin-Berglund method for the estimation of sugar in normal urines. When the excretion becomes virtually constant for any one rate of supply, the average is taken as the excretion for that rate, and so on with each of the diets in succession. The results are then plotted in the form of a curve. The curves so obtained are curves of excretion, but the difference between the excretion curve and the straight line supply curve give a curve of utilization and we are then enabled to study the rate of utilization as affected by supplies ranging from relatively low to relatively high levels or the reverse. During such a test there is of course no objection to plotting also the changes of the blood sugar percentage. But it may be pointed out that the total excretion for 24 hours when measured in milligrams by a method such as one of those mentioned, represents the aggregate effect for the whole period, and that during this period ups and downs of the blood sugar percentage and of the excretion occur. To obtain an aggregate picture of the blood sugar percentage requires multiple punctures and determinations at intervals all through the day at the cost of discomfort to the patient and time and labor for the observer. Moreover the results when obtained do not yield more and as a rule less direct information than that given by the excretion. The blood sugar curve does not indicate absolutely the number of grams of sugar excreted and

utilized respectively, the point of primary importance.

From the viewpoint of physiology, the procedure described has the advantage of permitting one to sustain a given supply rate for a long enough time to reduce to a minimum those errors that arise from periods of observation that are too short to allow the body to adjust itself to the conditions. It not infrequently happens that following the initiation of a specified rate of supply the permanent effects of that rate will not be dependably registered in the first hour or day, either in the urine or blood.

The clinical experiments described show that when different types of cases are studied as described they yield two distinct types of excretion (and utilization) curves. The method reveals a difference in the behavior of different types of cases. This appears to be a fact. That cases may be found which yield mixed or tran-

DIET, URINARY DATA, ETC., IN CASE OF SO-CALLED "RENAL GLYCOSURIA"

	DIET					URINE		Blood	
Date	C	P	F	"G"	Cal.	Volume	Sugar Gm.	Sugar %	REMARKS
10–10									
11	324	100	175	400	3271	1680	4.0		
10–11									
12	324	100	175	400	3271	1440	3.0		
10–12									
13	324	100	175	400	3271	1780	2.8	0.07%	
10–13									
14	324	100	175	400	3271	1540	3.1		Excretion=1% of Supply
10–14									
15	140	80	138	200	2122	1000	1.0		
10–15									
16	140	80	138	200	2122	1500	1.8		
10–16									
17	140	80	138	200	2122	1020	2.0	0.07%	Excretion=1% of Supply
10–17									
18	50	62	144	100	1744	1240	0.9		
10–18									
19	50	62	144	100	1744	1140	0.9	0.06%	Excretion=1% of Supply

CHART 4

DIET, URINARY DATA, ETC., IN CASE OF SO-CALLED "RENAL GLYCOSURIA"

	DIET					URINE		N	
Date	C	P	F	"G"	Cal.	Volume	Sugar Gm.		REMARKS
2–11									
12	47	70	128	100	1620	2200	5.7		Blood Sugar 0.10%
2–12									
13	47	70	128	100	1620	1560	5.5		5–6% of supply excreted
2–13									
14	47	70	128	100	1620	3300	4.6	7.0	
2–14									After fermentation
15	47	70	128	100	1620	2040	6.7		Urinary sugar=0.696 gm.
2–15									
16	140	80	138	200	2122	2400	16.0		Dextro-rotatory
2–16									
17	140	80	138	200	2122	1700	12.8		6–8% of supply excreted
2–17									
18	140	80	138	200	2122	2160	18.5		Blood Sugar=0.10%
2–18									
19	140	80	138	200	2122	1360	11.2	8.5	Insulin (Iletin No. 753) 5 units
2–19									
20	140	80	138	200	2122	2500	12.4		Insulin (Iletin No. 753) 10 units

CHART 5

sitional types of curves might be anticipated. The question rises as to what these different types of curve mean, physiologically and clinically, and in this connection it is unnecessary to urge any fixed ideas at the present time. Certain possibilities may be suggested, however.

It would seem to be definitely established that for the utilization of glucose in the body insulin is necessary, although of course insulin is not all that is necessary. Suitable intracellular conditions are required in order that insulin may exercise its function, and other conditions might be enumerated. But insulin is the *sine qua non*, and without it there appears to be no considerable oxidation of glucose. When therefore in an individual such as Case I it is possible to demonstrate that with a glucose supply as high as 400 grams per day, all but 4 to 6 grams are utilized day after day, the individual must be able to produce enough insulin to effect the utilization of 394 to 396 grams of glucose. At the empirical figure of 1 unit of insulin to 2 grams of sugar this would imply the power to produce at least 197 units of insulin per day, and whatever else might be wrong with the patient's body it would seem certain that he did not lack insulin producing cells in quantity sufficient to produce this large amount of insulin when called on to do so. We have strong reason to believe that a large percentage of all the insulin made in the body arises from the cells of the islets of the pancreas, because if they are totally removed the utilization of glucose sinks to a very low level. In cases of "total" diabetes in man 50 grams of glucose given by mouth may be recovered almost quantitatively in the urine in properly conducted experiments. Total pancreatectomy in dogs lowers the glucose utilization less perhaps, but still very greatly. The curve obtained in Case I might enable us to say, therefore, that whatever else might be amiss with the individual he possessed enough functionally active islet epithelium for all ordinary purposes. This conclusion would seem to be strengthened by the fact that the glycosuria was not reduced when the patient was given additional insulin from an outside source, enough in fact to eliminate a greater glycosuria in another type of case. Could it not be said then that this individual had no hypo-isletism in the sense of an underproduction of insulin by the islets of Langerhans? Does it not suggest that in this case the reception of insulin in the tissues or at least the effective employment of insulin in the tissues or the cells might be responsible for the glycosuria?

Insulin has been observed to be less effective per unit injected when administered to patients in a state of acidosis (with an alkali deficit) than it is in the same patient in the non-acidosic state. This I can vouch for from observation on a case of long standing virtually complete diabetes in periods in which acidosis was present and absent respectively. Infectious processes, as all know, may reduce the effectiveness of administered insulin quite apart from their power to depress endogenous insulin production. From such observations we know that a sufficient quantity of insulin may be supplied and still prove only partly effective. It might seem quite possible that in cases like Case I the tissue or cellular condition makes insulin less effective. The arterial disease might possibly be identified with these tissue conditions. Possibly in such a case we are dealing with a mottled or spotty diabetes, if we may so describe it, a peripheral or tissue diabetes, as opposed to a general or central diabetes of islet origin. Some of the tissues or cells of the body might be conceived as burning glucose well, others less well. The latter excreting their unburned sugar into the blood would account for an hyperglycemia, with some overflow into the urine.

Another idea that might be stated for what it is worth is that possibly the islets in such a case, although capable of high insulin production under stimulation are relatively sluggish in their responses to normal stimuli. The innervation of the islets or the blood vessels of the islets might be damaged, possibly as part of the same general process that affects the arteries and nerves of the feet and legs in these same cases. If this were true there would be in such cases a relative lack of insulin for any given supply of glucose. The blood sugar percentage would have to rise to a higher level than in a normal case to stimulate the islets to the same production of insulin. This idea might

seem less tenable than the other on the ground that if this were the case one might rather expect a greater result from administered insulin, although this would not positively negative the idea, since the administration of insulin by causing a beginning fall in the blood sugar percentage might induce a compensatory lowering of the endogenous insulin supply and so have no permanent effect on the amount of insulin in circulation.

Cases which give curves like that shown in Case II or any curve in which increasing the glucose supply up to a certain level causes relatively little or no rise in the excretion, but in which progressively increasing the glucose supply beyond this point causes a rapid and progressive increase of the percentage of the supply excreted, as shown by an upward bend or break in the curve, suggest a definite inability to produce insulin in excess of a more or less sharply definable limit. The possibility is suggested that this type of curve indicates a deficient insulin production, a deficiency of the islet apparatus itself, a general diabetes of central or islet origin. One might perhaps picture islets capable of functioning normally under limited loads but failing like weakened hearts when called upon to do more.

The group of cases classified as cases of renal glycosuria show curves resembling that of Case I and would indicate also that the insulin production in general is not greatly subnormal. Whether these cases are also due to conditions in the tissues and whether they represent a special group of what we have alluded to as peripheral, or tissue diabetes with the kidneys involved in the process, is a conjecture, but one not without possible interest. Whatever interpretation may be preferred, the study of excretion and utilization curves under a known range of glucose supplies presents, I believe, a method of testing the sugar using function which brings out new possibilities.

Discussion follows paper of Dr. Harris, page 173.

INSULIN IN THE TREATMENT OF SEVERE CASES OF DIABETES MELLITUS*

By JAMES E. PAULLIN, M.D.,
Atlanta, Ga.

In presenting a paper as part of a symposium on insulin it has been considered advisable, because of the lack of time, to offer only the methods employed and the results obtained by personal experience in the treatment of diabetes. It has been repeatedly and wisely emphasized by various writers that insulin is not a cure for diabetes. It is, however, a most valuable and life-saving adjunct in the treatment of this disease. With its intelligent use a diabetic may be kept in an healthy state of nutrition and free from the progressive loss of strength and lowered vitality incident to prolonged treatment by undernutrition. Instead of minimizing dietetic control, as our enthusiastic popular writers would lead us to believe, insulin has more than ever magnified the importance of intelligent dietetic study and management.

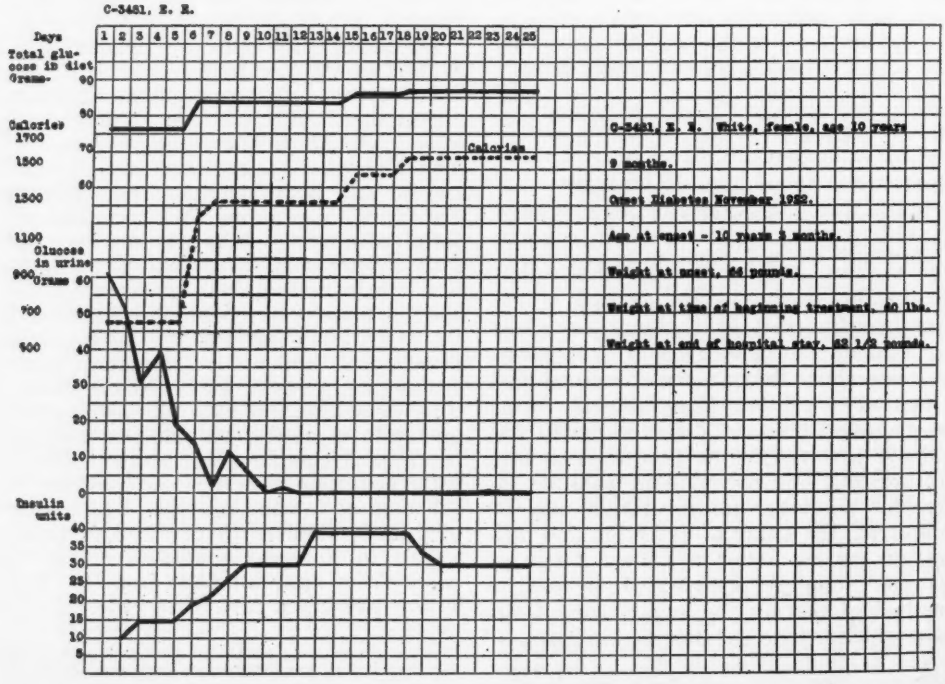
The exact method by which insulin accomplishes its results is as yet an unsettled question. There is in the minds of some a doubt as to whether insulin effects more foodstuffs than the carbohydrate. It is possible that the metabolism of protein and fat may be influenced to a certain extent other than through the complete oxidation of glucose. It is a known fact that with insulin and correct dietary regulation it is possible to keep a severe diabetic upon a satisfactory diet and in a "non-diabetic status," as evidenced by a normal blood sugar and urine free from sugar, acetone and diacetic acid. At the present time we believe this to be the result of the oxidation of glucose in sufficient quantity to cause a complete metabolism of the fatty acid molecules derived from the katabolism of fat and protein. The amount of glucose oxidized by one unit of insulin varies in different diabetics. In severe cases from approximately one to three grams are taken care of by the recently

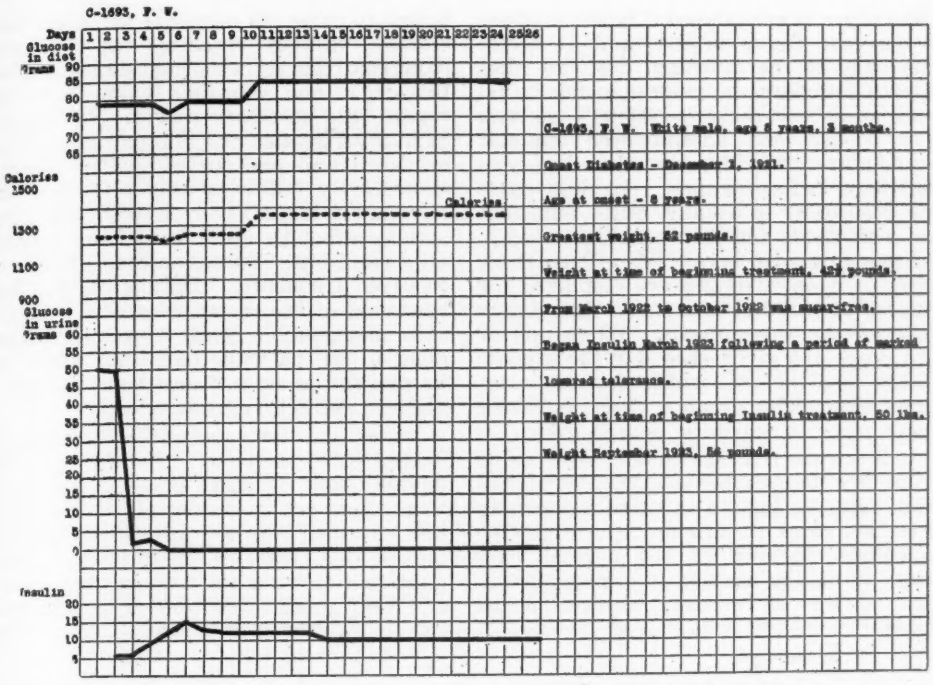
*Read in Section on Medicine, Southern Medical Association, Seventeenth Annual Meeting, Washington, D. C., Nov. 12-15, 1923.

established unit. In mild cases from three to five grams may be oxidized by one unit.

Tolerance.—Before the administration of insulin is begun it is necessary to establish a suitable diet which will serve as a basis for testing the patient's ability to utilize the glucose. There are several methods which may be used for this particular purpose. Without going into the merits of the various methods, the one which is simple, easy of employment and accurate enough for clinical results is that most desired. To this end it has usually been our custom to calculate and give a liberal diet at the very beginning in uncomplicated cases without acidosis, allowing for adults 25 to 35 calories per kilogram of body weight and so balancing the diet that the patient receives from 0.7 to 1 gram of protein per kilo and the ratio between glucose and fatty acid derivatives does not usually exceed the $\frac{FA}{G} = \frac{1.5}{1}$ as advocated by Shaffer and Woodyatt. The patient receives this diet for a sufficient length of time, usually three or four days, to determine the average amount of glucose wasted through the urine. In children and young adults it is necessary to give a higher protein increment, allowing from 1 to 3 grams per kilo and the caloric ration should be from 50 to 70 calories per kilo. One must bear in mind that many severe diabetics present themselves in a most marked state of undernutrition, and in calculating the diet for this particular individual this fact must be noted and due allowance made for the food necessary to add weight.

By following the procedure as outlined hospital days are saved the patient and his dosage of insulin can be more quickly established. With intelligent patients we have found that hospitalization for two or three weeks is quite sufficient to give the usual dietetic instruction and sufficient diabetic training to enable them to figure diets and use insulin in an intelligent manner after their return home. An attempt is always made to build up a diet sufficient in calories so that the patient will be furnished ample nutrition to follow


C-3481, E. K.
Days
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Total glucose in diet Grams
Calories
Calories
Glucose in urine Grams
Insulin units
C-3481, E. K. White, female, age 10 years 9 months.
Onset Diabetes November 1922.
Age at onset - 10 years 3 months.
Weight at onset, 64 pounds.
Weight at time of beginning treatment, 60 lbs.
Weight at end of hospital stay, 62 1/2 pounds.


C-1693, F. W.
Days
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
Glucose in diet Grams
90 85 80 75 70 65
Calories
1500
1300
1100
900
Calories
Glucose in urine Grams
60 55 50 45 40 35 30 25 20 15 10 5 0
Insulin
20 15 10 5
C-1693, F. W. White male, age 8 years, 3 months.
Onset Diabetes - December 2, 1921.
Age at onset - 6 years.
Greatest weight, 82 pounds.
Weight at time of beginning treatment, 42½ pounds.
From March 1922 to October 1922 was sugar-free.
Began Insulin March 1923 following a period of marked lowered tolerance.
Weight at time of beginning Insulin treatment, 50 lbs.
Weight September 1923, 56 pounds.

his occupation. In some individuals, particularly those doing hard labor, this may not always be possible because of the expense incident to large doses of insulin. With mild cases it is easily done and they may be kept in a state of wholesomeness both mental and physical. It is our purpose still to carry the majority of our cases slightly undernourished rather than maintaining a so-called standard weight for height and age. For cases presenting themselves with complications such as acute infections, marked acidosis, coma, gangrene, etc., an entirely different procedure will be described later.

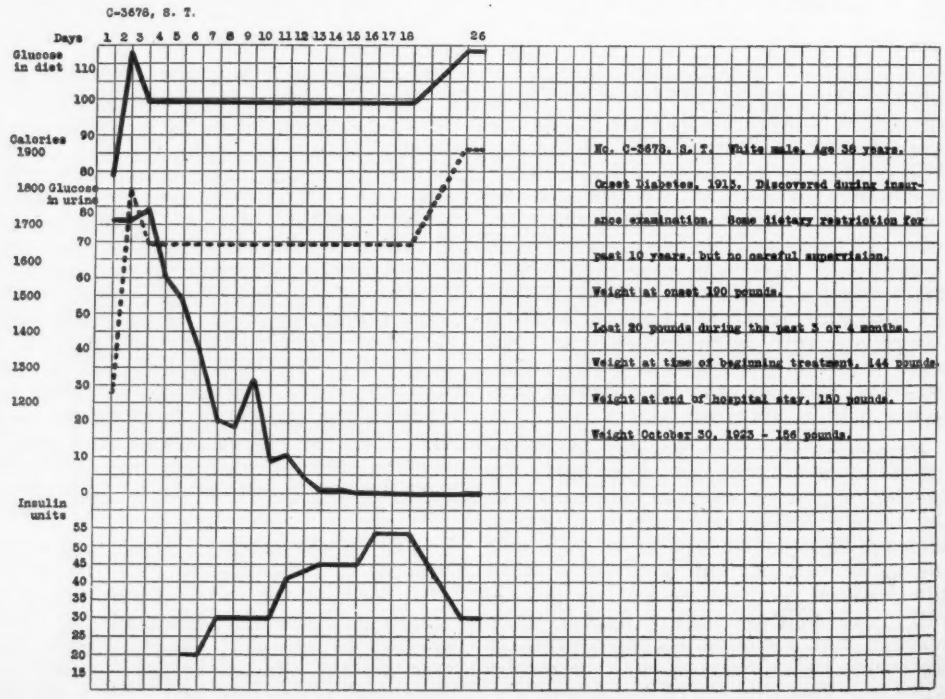
Dosage.—After the patient is established on a satisfactory diet and the amount of glucose wastage determined in the urine it is then our purpose to give a sufficient amount of insulin to overcome the waste. In calculating the dose to be administered and in order to remain within safe limits so that no hypoglycemic reaction will be obtained, we assume, in the severe cases, that one unit of insulin will cause the oxidation of 3 grams of glucose. The dose to be given is obtained by dividing the grams of glucose in the total twenty-four-hour urine by 3, which gives the total dosage of insulin for the twenty-four-hour period. As an example, suppose the diabetic excreted in several twenty-four-hour periods an average of 50 grams of glucose. Suppose that one unit of insulin will cause the oxidation of 3 grams of glucose, then for twenty-four hours the dosage would be approximately 17 units. This, perhaps, will not be a sufficiently large dose to render the patient sugar free. Additional units may be required and can easily be given the next day. This method we believe to be a safe working formula and one not attended with danger of producing an hypoglycemia.

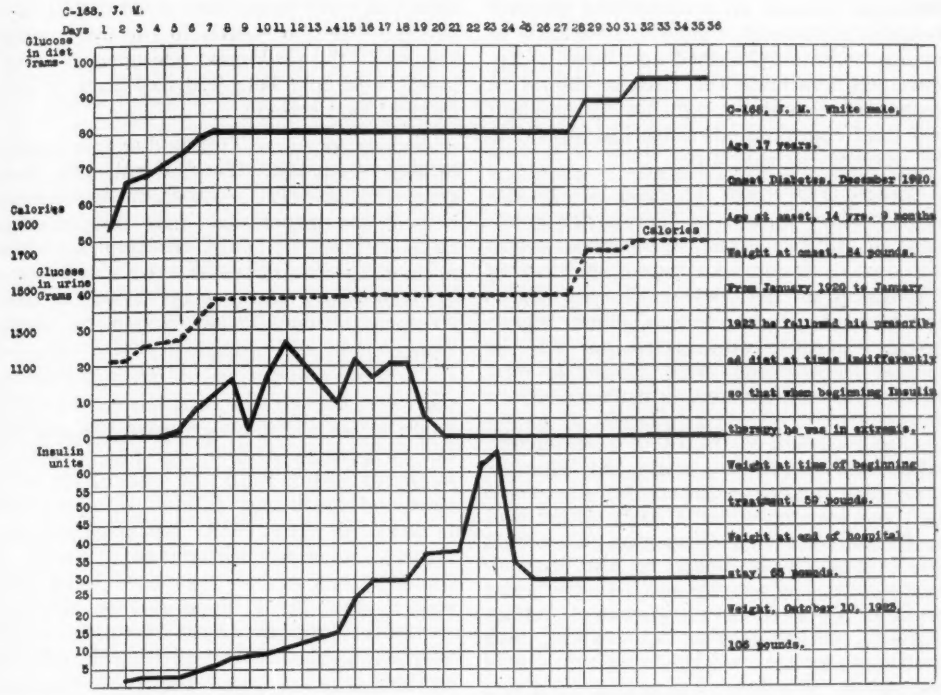
In all of our cases we prefer at the beginning of treatment to give the calculated dose for the day in three injections equally divided and administered from one-half to one hour before meals. So soon as the required dosage to keep the individual sugar free and with a normal

blood sugar is established it is our purpose to decrease the noon dose and, if necessary, add to the morning dose so that after a few days the patient is able to remain in a "non-diabetic status" on two doses a day, one administered one-half hour before breakfast, the other dose one-half hour before supper. In mild cases one dose daily is usually quite sufficient for their needs and this is administered in the morning with breakfast. When three doses of equal strength are employed the glucose of the diet is equally distributed between the three meals. When one or two doses are given each day the glucose of the meal before which insulin is injected should be greater than in those meals prior to which no dose is given.

It is known that the insulin effect lasts about five hours after injection so that in administering insulin in three doses daily in severe cases we attempt to imitate the conceived working of the normal pancreas by having constantly during the entire period of glucose absorption an amount of insulin in the blood stream sufficient to cause its complete oxidation and storage, thereby rescuing the damaged pancreas from an abnormal demand upon this organ and affording it ample rest to regain its secretory power. As this is partially regained the mid-day dose is diminished and perhaps altogether discontinued. By following this procedure we have never had a severe hypoglycemic reaction, although there have been several mild reactions. These, however, have not occurred frequently. Despite all that has been said of the severe reactions from insulin and possible death from overdosage, none of our patients has been afraid of its use and in no instance have we had a diabetic refractory to its effect.

Administration.—Insulin is best administered subcutaneously. It may be given intravenously in cases of coma or where more rapid action is desired. The extract now obtained is practically free from protein, so that reactions due to protein sensitization following its use are very rare and very mild. The time of administration in reference to the meal hour is im-


C-3678, S. T.
Days 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 26
Glucose in diet
Calories 1900
1800 Glucose in urine
1700
1600
1500
1400
1300
1200
Insulin units
No. C-3678. S. T. White male. Age 36 years.
Onset Diabetes, 1913. Discovered during insurance examination. Some dietary restriction for past 10 years, but no careful supervision.
Weight at onset 190 pounds.
Lost 20 pounds during the past 3 or 4 months.
Weight at time of beginning treatment, 144 pounds.
Weight at end of hospital stay, 150 pounds.
Weight October 30, 1923 - 156 pounds.


C-166, J. M.
Days 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
Glucose in diet Grams
Calories
Glucose in urine Grams
Insulin units
Calories
C-166, J. M. White male,
Age 17 years.
Onset Diabetes, December 1920.
Age at onset, 14 yrs. 9 months
Weight at onset, 84 pounds.
From January 1920 to January
1923 he followed his prescribed diet at times indifferently
so that when beginning Insulin
therapy he was in extremis.
Weight at time of beginning
treatment, 59 pounds.
Weight at end of hospital
stay, 69 pounds.
Weight, October 10, 1923,
106 pounds.

portant. The usual procedure employed is to give the injection one-half hour before the meal. In some patients apparently with delayed digestion better results are obtained if it is given at the meal hour. The latter cases, however, are rare and the majority of patients fare better when the injections are given before the meals. Occasionally cases are seen who will perhaps require four injections of insulin daily to remain sugar free.

One such case would usually remain sugar free all day on three doses and then excrete a few grams of glucose between 6 a. m. and 9 a. m. In this instance we preferred not to give an excessively large dose of insulin at night for fear of a considerable reaction during sleep. She was rendered sugar free by giving an extra five units at 4 a. m. With the needed rest given the pancreas it was only necessary to continue this dosage for about two weeks, when the usual three doses were resumed.

Precautionary Measures.—Some individuals have obtained very erroneous impressions about insulin. Certain patients have shown a remarkable improvement in tolerance with its use, yet no cures are reported. Be it understood that the diabetic who takes insulin is not licensed to cast aside dietary restrictions. The dosage is determined upon the assumption that the patient will ingest a definite amount of glucose daily. Should this quantity not be taken an hypoglycemic reaction will occur, depending in its severity upon the amount of glucose diminished in the diet. In the presence of infection the tolerance, even with an established dose of insulin, is lowered to some extent, depending on the severity of the infection, although with even mild infections the diminution in tolerance is very striking. With lowered tolerance there will be excretion of sugar and incomplete oxidation of fat and acidosis. To avoid such a complication the fat content of the diet could at once be lowered by at least 50 per cent or more and the insulin dosage increased to overcome the extra sugar excretion. By following this procedure we have safely piloted one patient through an attack of bronchopneumonia complicated with empyema, rib resection and long-time

drainage without an acidosis and without constant glycosuria. Should the supply of insulin become exhausted and none be immediately available the patient should be instructed to reduce the diet by one-half and then communicate with his physician for further instructions.

Coma.—The most spectacular results are usually obtained in the insulin treatment of diabetic coma. General measures for combating coma such as warmth, free evacuation of the bowels, forced fluids and careful nursing are of great importance. Insulin administration may be started immediately with an initial dose of 15 or 20 units given subcutaneously or intravenously. This is followed by an injection of 10 to 20 units of insulin subcutaneously every two hours. At the same time care should be taken that the urine does not become sugar free in order that an hypoglycemic reaction may not occur; this is best accomplished by the oral administration of orange juice in the ratio of 20 or 30 c. c. for each unit of insulin injected and by testing separately each specimen of urine voided for diacetic acid and sugar. In cases of vomiting the stomach should be washed out before attempting to administer orange juice. If vomiting persists and the patient is not able to retain orange juice, a 10 to 20 per cent solution of glucose should be injected intravenously or a 5 per cent solution may be given by proctoclysis in the ratio of 2 to 3 grams of glucose for each unit of insulin. Should orange juice not be available for administration cane sugar or milk may be given by mouth in the proportions as above outlined.

Treatment should be continued until the urine is free from diacetic acid and acetone and the symptoms have been relieved. A diet containing a little or no fat is then given and gradually increased to the required amount. It may be found that after the immediate symptoms of coma have been overcome the patient will have a high tolerance for glucose and that further insulin treatment is unnecessary.

Sodium bicarbonate, 10 to 40 grams in twenty-four hours, administered by mouth or rectum, is advisable. It will assist in neutralizing some of the remaining fatty acid, but most important of all it will supply the deficit of alkali in the blood occasioned by the prolonged presence of acetoacetic acid and beta-hydroxy-butyric acid in the blood stream.

Hypoglycemia.—This is due to an overdosage of insulin. The patient may have received too large a dose or having received the proper dose may not take his meal afterwards. The reaction occurs as a result of the depression of blood sugar below 0.07 per cent or less. The first manifestation is usually nervousness or weakness, emotional instability—in children fretfulness and crying—anxiety, sweating, paleness, prostration, dilatation of pupils, rapid pulse, increased respiration, muscular twitchings, and if the percentage of sugar is lower than .03, convulsive seizures and death may follow. The antidote is sugar in some easily assimilable form. Orange juice, several pieces of candy, a glass of milk or two teaspoonfuls of ordinary sugar will relieve the ordinary symptoms immediately. If coma has already appeared 10 or 15 minims of 1 to 1/1000 solution of adrenalin chlorid subcutaneously by virtue of its effect upon the mobilization of the blood sugar will arouse the patient sufficiently to swallow some substance containing sugar. Intravenous injections of 100 c. c. of a 10 per cent glucose solution may be advisable. When treatment has been properly outlined and the directions carefully followed no reaction of this type need be anticipated. Patients are usually warned and instructed as to the possible appearance of the above symptoms and are familiar with the simple methods used in combating them.

Results.—Our series of diabetic patients who have received insulin has exceeded sixty cases. We have had two deaths, one occasioned in an elderly man who had had diabetes for ten years, who presented himself with a very extensive gangrene involving the left foot and leg as far up as the knee, which had been present for approximately three weeks. Amputation was done under gas oxygen and local anesthesia. The patient died three days later with gas bacillus septicemia without acido-

sis. The other death resulted in a patient who had bronchopneumonia, empyema, rib resection and drainage of the empyema cavity for four or five months. His death resulted from chronic sepsis, not from diabetes. Four patients presented themselves in coma and all recovered. The remainder of the patients have gained satisfactorily in weight, for a greater part of the time are sugar free, and enjoy splendid health.

Several charts are shown representing severe diabetics who have responded favorably to the treatment as outlined above.

Discussion follows paper of Dr. Harris, page 173.

THE USE OF INSULIN BY THE GENERAL PRACTITIONER*

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Joslin estimates that in the United States there are more than 1,000,000 diabetics, all of whom should be under the care of physicians. Only a few thousand diabetics will be cared for in hospitals and infirmaries that are especially equipped to treat diabetes; and the many hundreds of thousands who should receive the benefits of insulin and diet must be treated by their family physicians. It is then the obligation, as well as the opportunity for service, of physicians everywhere to be prepared to use insulin and to prescribe the proper diet in diabetes. There is also no reason why insulin should not be used by the careful, well equipped general practitioner.

When insulin was first used clinically, before a standardized extract had been perfected, and before its dosage and its relation to diet had been worked out, a few severe hypoglycemic reactions were observed. It was therefore considered necessary in all cases in which insulin was used to know the amount of sugar in the blood before, and at one or more two-hour periods after the initial doses, while at the same time frequent determinations of the carbon dioxid combining power of the blood and other laboratory investigations were made. This meant that it was essential to the safe use of insulin for the patient to be under constant observation in a hospital or infirmary, having a well equipped laboratory. Now since the carbohydrate values of insulin have been determined, and its effects are better understood, there is no longer the fear of dangerous reactions.

Another reason why the general practitioner was denied the use of insulin until recently was that only a limited supply was available, and the manufacturers placed that in the hands of a selected group of clinicians for use in the severe cases. Now that an adequate supply of a purified and standardized product is being manufactured, insulin not only can be used by general practitioners, but it is being used successfully by many of them. The physician should understand, however, that in using insulin he is dealing with the extract of a powerful internal secretion, which, when rightly used, saves lives. If not properly safeguarded by diet and careful observation of the patient after the initial doses, it has dangerous possibilities.

MISINFORMATION REGARDING INSULIN

The daily papers and magazines have published exaggerated statements regarding the curative powers of insulin, and many laymen believe that an easy cure for diabetes is now obtainable without the patient's having to be denied anything he wants to eat. As a result of such publicity hungry diabetics everywhere are seeking the new "serum;" and in some cases, insulin has been used without proper consideration for diet and therefore with disappointing results.

Insulin was thrown into disrepute in one city because a prominent citizen "ate what he wanted" while using insulin. He came near dying from a food debauch which brought on an attack of acidosis, with threatened coma. It was known in the city that he was using insulin and the lay public, as ignorant regarding the dangers of overeating by diabetics as it was ill informed regarding the use of insulin,

*Read in Section on Medicine, Southern Medical Association, Seventeenth Annual Meeting, Washington, D. C., Nov. 12-15, 1923.

attributed the serious illness of a beloved and prominent citizen to the new treatment of diabetes. The careful physician will forestall such an occurrence in his practice by impressing his patient with the fact that if he expects to derive any benefit from insulin he must follow the diet prescribed by him.

HOW TO DETERMINE THE DOSAGE OF INSULIN

Except in coma, or cases threatened with coma, and the acute infections in diabetics, insulin should not be begun until the diabetic has been for several days on a maintenance diet of known glucose values, and the amount of sugar excreted per day has been determined. It is desirable, but not essential, for the amount of sugar in the blood to be determined at varying intervals; but the general practitioner may obtain specimens of blood and send them to a laboratory. He need not wait for a report on the blood sugar. If the patient is excreting more than a trace of sugar after three or four days on his basal diet, insulin may be begun, using small doses, 2 to 5 units, in the beginning and rapidly increasing the dose until enough is used to metabolize the amount of sugar equivalent to that excreted in the twenty-four-hour urine. In this way the urine can soon be rendered sugar free, except in very severe cases.

It is safe to estimate that one unit of the improved insulin will take care of two grams of glucose if that amount is excreted in the urine. Thus if a diabetic of any age or weight, after three or four days on his estimated maintenance diet, excretes in his urine 45 grams of sugar a day, 20 to 25 units of insulin a day will render his urine sugar free, if he remains on the same diet. If only 30 grams of sugar is excreted in 24 hours, 15 units of insulin a day usually will be sufficient to metabolize the intake of carbohydrate above his tolerance. When the patient on his basal diet becomes sugar free, the diet may be increased. Many diabetics can be kept sugar free on 10 units a day and the mild cases may not require more than 5 units. The average daily dose of insulin in our Clinic has been about 15 units. Forty per cent of the diabetics we have treated in the past year have been rendered and have been kept sugar free without the use of any insulin. Banting estimates that as diabetics are treated earlier probably 80 per cent can be kept well nourished without insulin.

More insulin can be given a patient in an infirmary or hospital, or when he is in bed at home with a trained nurse in attendance, than if the patient is at work, because if the insulin reaction occurs it can be combated at once, and there is also less danger in a reaction when the patient is resting quietly in bed because exercise tends to reduce blood sugar. It is better to give a patient who is at his work a little less insulin at the beginning of his treatment and have a trace of sugar in his urine than to run the risk of a reaction by giving too much.

The patient using insulin should be made to understand that if for any reason his food is cut down his insulin dose should be reduced in proportion. If he fasts a day he must use no insulin without explicit directions from his physician; and if diarrhea develops the dose of insulin should be reduced because food may pass through the intestines without digestion and the diabetic with diarrhea may have a low blood sugar which, with the addition of insulin, may be reduced to a dangerously low level. A number of clinicians have reported severe hypoglycemic reactions from the use of even small doses of insulin with diabetics who have diarrhea.

THE TIME OF ADMINISTRATION

There is a difference of opinion as to the best time for the administration of insulin. We believe, however, that the method employed in the Toronto Clinic of using insulin twice a day, 20 minutes before the morning and evening meal, has many advantages. In the severe cases insulin may be given before each of the three meals and if the patient is sick enough to require a night nurse, the midnight dose may be added. In the case of laborers, Woodyatt and Wilder advise giving only one dose a day and that before breakfast. In such cases most of the carbohydrates for the day are given for breakfast.

THE METHOD OF ADMINISTRATION

It may be stated, without fear of contradiction, that no pancreatic extract or other preparation said to contain insulin is of any value whatever when administered by mouth. The only method of administering insulin that will give any results is hypodermatically, under the skin, and not intramuscularly. When administered intramuscularly insulin causes pain because it has a slightly destructive and irritant effect upon muscular tissue.

The subcutaneous spaces in the outer surface of the arm, two or three inches below the shoulder, and over the breast and abdominal muscles are favorable sites for the use of insulin because it can be used there without causing tension of the skin. The needle should not be used at the same place twice in succession because it may produce scar tissue and the insulin, if absorbed at all, would be absorbed very slightly. The fine platinum, or gold, hypodermic needle, which can be sharpened every few days on a fine stone, and which can be flamed, is less painful than the ordinary needle and its use saves the time necessary for boiling the steel needles. The initial cost of the platinum, or gold, needle is more, but since they do not rust, it is economical in the long run to use them. Strict asepsis should be taught to, and practiced by, the diabetic using insulin because even a slight infection may change a mild case of diabetes into a severe one.

THE INSULIN REACTION

For a time it was felt that the reaction from an overdose of insulin might result in lowering the blood sugar to the lethal limit of below 0.04, but with experience there is no longer fear of the insulin reaction with the size doses now ordinarily used. Unfortunately some one called the hypoglycemic reaction "insulin shock," which has had the effect of unduly stressing the dangers of an overdose of insulin. Indeed, it is desirable for patients using insulin to have an occasional reaction, the symptoms of which are hunger, weakness, nervousness and sometimes profuse perspiration. We have had many reactions with our patients, who are relieved in a very few minutes by taking three ounces (one-half glass) of orange juice, or ten grams of glucose in water, or a chocolate drop weighing about 15 grams. A glass of milk will also relieve the symptoms of the insulin reaction.

While the insulin reaction is usually harmless, it is within the range of possibility that a severe reaction could occur in which the symptoms would be collapse and unconsciousness. Children with severe insulin reaction may have convulsions, but with the size doses that are used these symptoms are not likely. In other words, in my judgment there is no more danger of a serious reaction from the use of insulin than there is from the use of thyroid extract. If a serious reaction should occur the best treatment is to give adrenalin, 0.5 to 1 c. c., hypodermatically, which will restore consciousness in a few minutes by mobilizing the glycogen in the liver. The effect of adrenalin, however, is evanescent and the patient should at the same time, or as soon as consciousness returns, be given orange juice or glucose by mouth. Glucose may be given intravenously if the patient is unconscious.

I know of one case in which a mistaken diagnosis had been made of coma in which the physician gave the patient, who had had no nourishment in hours, 100 units of insulin. The patient was unconscious at the time the insulin was given, but three days after was living, so the 100 units had done no harm. We have given as high as 250 units in 12 hours to a patient in coma, but at the same time 400 grams of glucose were given to cover the insulin. If there is any fear of insulin reaction, orange juice or glucose may be given at the same time the insulin is given. An unlimited amount of insulin can be given provided enough soluble carbohydrate is given to be metabolized when the patient has the extra insulin in his blood.

INCREASED DOSES IN INFECTION

There are no fixed doses of insulin for any groups or classes of diabetics. The dose for each patient must be worked out according to his proved glucose tolerance, and the dose may vary with an individual diabetic, sometimes without any discernible cause. The dose of insulin must be

increased with the occurrence of infections because they lower sugar tolerance and tend to the production of ketone bodies. This is particularly true of the lung infections in diabetics, in whom coma was the frequent modus mortui up to the time of insulin. Now the diabetic with pneumonia can be carried through the crisis by giving large doses of insulin, 50 to 100 units a day, the dose depending upon the amount of sugar and ketone bodies in the urine. Even a slight cold may result in pneumonia and thus precipitate coma. The diabetic with coryza or bronchitis therefore should be put to bed and several specimens of urine examined a day. If the amount of sugar is increased and ketonuria appears the dose of insulin must be increased and the fats in the diet decreased. Often it is necessary to cut out the fats entirely and increase the carbohydrates until acetone and diacetic acid disappear from the urine.

INSULIN IN THE SURGERY OF DIABETES

Before the discovery of insulin, operations upon diabetics were followed by a high mortality. Now operations upon diabetics who have been prepared by the proper diet and the use of insulin are as safe as upon any other class of individuals. Except in a very few severe diabetics who occasionally seem to be totally depancreatized, the blood sugar can be reduced to normal and ketone bodies can be removed from the blood in a very few days. Gas-oxygen is the preferable anesthetic because ether tends at least temporarily to lower glucose tolerance. Chloroform should never be used upon the diabetic because arteriosclerosis is frequently associated with diabetes and no one can tell the state of a heart muscle if there is possible sclerosis of the coronary arteries. Local or spinal anesthesia is preferable to a general anesthetic, particularly in surgery of the extremities. Even major operations upon the diabetic, as those of the abdominal cavity, may often be performed under local anesthesia.

Following operations of any kind upon the diabetic the urine should be examined for sugar and ketone bodies every three or four hours. If there is no acetone or diacetic acid in the urine and the patient can take no nourishment, it is best not to give insulin the first 24 hours after operation; but if there is ketonuria the insulin should be given and glucose given, intravenously if necessary, 2 grams to each unit of insulin. If there is a tendency to acidosis, 30 or 40 units of insulin may be given three or four times a day, or every three hours in severe cases; but at the same time 60 or 80 grams of glucose should be given to prevent a hypoglycemic reaction. If there is only a small amount of diacetic acid in the urine, 10 or 15 units may be given three times a day, giving at the same time 20 or 30 grams of glucose either by mouth or intravenously. If the patient can retain it, cold orange juice may be given instead of glucose. One glassful, 6 ounces, of orange juice contains 20 grams of carbohydrate.

If glucose has to be given intravenously, it is important for it to be sterile, but the solution should never be boiled, because boiling cooks sugar and forms a caramel-like substance, which in the blood may cause death. If the sterile solution has to be made fresh, boil the water and take off the stove, then add the glucose to make a 5 per cent solution, place in sterile bottles and cool to body temperature by running cold water over the bottles.

An important post-operative procedure with diabetics is to give them plenty of fluids, not less than 2 litres (quarts) of fluid a day. If the patient is vomiting, it is best to give water by hypodermoclysis. It will not do to depend upon proctoclysis for the administration of fluids and glucose to the diabetic after operations, because absorption from the colon is uncertain and the post-operative diabetic must have fluids and carbohydrates to keep down acidosis.

THE DIFFERENTIAL DIAGNOSIS OF DIABETIC COMA

The general practitioner should be able to distinguish diabetic coma from other forms of coma and he should know how to use insulin because at any moment upon this knowledge may depend the life of his diabetic patient. Unless the proper treatment for coma is begun early the prognosis is bad either with or without the use of insulin. Joslin says that the first hour

is worth all the rest in the treatment of diabetic coma. If insulin is begun early and the patient cared for properly in other ways, a very large proportion of cases may be saved. There is nothing more dramatic in medicine or surgery than to see the early coma case pass from impending death to consciousness and life by the use of insulin; and likewise there is nothing sadder or more tragic than to see coma deepen into death in the neglected cases.

In the treatment of coma the first and most important question is an accurate diagnosis. There is no doubt that in many cases of diabetes the physician sees the patient for the first time in coma. Such cases are not infrequently diagnosed as appendicitis or intestinal obstruction, because abdominal pain and obstinate constipation are frequently the outstanding symptoms.

A recent case that came under observation by one of the staff of our Clinic was diagnosed as intestinal obstruction and referred to a surgeon who, in examining the case preparatory for operation, found the urine loaded with sugar. The blood sugar was found to be 500 mgs. per 100 c. c. of blood. In another case recently referred to us the first symptoms were pain in the abdomen, nausea and drowsiness. The patient's family physician had found sugar in his urine about a week before the acute attack and rightly made the diagnosis of acidosis. The patient arrived in Birmingham four hours later and was in pronounced coma. There was rigidity of the abdominal muscles and marked tenderness over the abdomen so that upon the slightest touch he would writhe in agony. His temperature was 101° F., pulse 136, and he was gasping for breath. There was obstinate constipation. This was a typical picture of a ruptured appendix to which was added unconsciousness. This patient, a boy of 17 years of age who had been considered well until a week before, had not been sick enough to take to his bed until the day coma developed. On arrival at the Infirmary his blood sugar was 500 mgs. per 100 c. c., his urine contained 6 per cent sugar and there was marked ketonemia and ketonuria. In 12 hours he was given 250 units of insulin, guarded with 450 grams of glucose. No attempt was made to render the urine sugar free the first 24 hours, but the effort was made to increase carbohydrate metabolism and thus burn up the ketone bodies in the blood. The boy came out of the coma in 12 hours and in a few days his urine was rendered sugar free. It has remained so since on 30 units of insulin a day, which he gives himself in two doses, before the morning and evening meal.

I saw one case of uremia in which 100 units of insulin had been given without the family physician's having even examined the patient's urine. Forty-eight hours after the patient became unconscious she was sent to a hospital with a diagnosis of diabetic coma. A catheterized specimen of urine contained no sugar and her blood sugar was normal, but the presence of albumin, casts, etc., in the urine and other findings proved the coma to be due to uremic poisoning.

The frequent association of diabetes with nephritis should be remembered. In such a case we found it difficult to decide whether the patient was in partial coma from hyperglycemia or uremia. He had been a diabetic for years, but a low blood sugar and the absence of ketonuria, with a low phthalein output, with albuminuria, casts in the urine, etc., made the diagnosis of uremia certain. Joslin reports a case of apoplexy in which insulin had been given the patient. With such possibilities of error in the diagnosis of persons who are unconscious the first important step in using insulin in coma is to be certain that it is of diabetic origin.

THE TREATMENT OF COMA

The general practitioner should be prepared at all times to treat diabetic coma, because an emergency call at night may be to such a patient. He should carry in his handbag 200 or 300 units of insulin, a bottle of glucose, a few test tubes, small bottles of the reagents for Benedict's qualitative and quantitative tests for sugar and the tests for acetone and diacetic acid. A spirit lamp and a small bottle of wood alcohol are useful, though the tests for sugar may be made by placing the test tubes containing the reagents and urine in a tin cup of boiling water on a kitchen stove and keeping them there for five minutes. While it is not essential, the physician may also carry a luer syringe for obtaining specimens for blood sugar examination, a few Wassermann tubes, a small vial of potassium oxalate crystals to prevent coagulation and some picric acid to precipitate the proteins in the blood. If the physician is prepared to examine the blood for sugar, pipettes, graduated test tubes and the reagents for the Benedict-Lewis blood sugar determination may also be added; for that, too, can be carried out with the aid of a cup of boiling water on a kitchen stove.

The first thing to do in suspected diabetic coma is to examine a specimen of

urine for sugar and diacetic acid. If both are present in large quantities one need not wait to make the quantitative tests or for a blood sugar determination before giving 15 to 30 units of insulin and at the same time give a glassful of orange juice (30 grams) or (1 to 2 ounces) of glucose in water. The glucose may be added to the orange juice, though it is important to keep an accurate account of the amounts given.

The next step is to clear out the colon by enemata, repeating them every hour until there has been a thorough bowel evacuation. An ounce of magnesium sulphate may be given by mouth if the patient can swallow. If food has been taken within three hours before the physician sees the case, the stomach should be emptied by gastric lavage. A quart of water may be left in the stomach after the stomach is empty of food.

Water by mouth, if the patient can swallow, is important, not less than 1 pint every 2 hours for an adult coma patient. One should be very sure that the patient can swallow before giving water by mouth. It is perfectly possible to drown an unconscious patient by giving water, or a glucose solution, in spoonful quantities. If the laryngeal or epiglottidean reflexes have been abolished fluids given by mouth will gravitate into the open larynx. If there is any doubt about the patient's being able to swallow, the glucose solution should be given intravenously and water 1 pint every 2 hours may be given by hypodermoclysis.

If the patient cannot void his urine, a catheterized specimen should be obtained every half hour. If in one-half hour the examination of a second specimen of urine shows no change in the amount of sugar and diacetic acid, 30 units of insulin and 60 grams of glucose may be given; and in an hour this dose may be repeated if there is no change in the amount of diacetic acid. After the initial doses 30 units of insulin may be given, always guarding it with twice as many grams of glucose or dextrose, every 2 or 3 hours until the patient comes out of coma. We have given 250 units in 10 hours and Petty has given 500 units to a coma patient in 24 hours. There is no danger whatever in giving large doses of insulin provided enough glucose is given at the same time. It should be understood that in treating diabetic coma one is not trying to render the urine sugar free. It is the acidosis, manifested by the presence of acetonuria, that needs to be combated; and in giving glucose or dextrose or other form of carbohydrate to the coma patient it not only prevents insulin shock, but "the fatty acids are burned in the fire of the carbohydrates."

After the patient comes out of coma the dose of insulin should be reduced and the amount of carbohydrate should be correspondingly diminished. Usually 20 units three times a day and 60 grams of glucose forming food should be given and no fats, or only a small portion, until the diacetic acid disappears from the urine. In the fat subject it is sometimes necessary to give more carbohydrate and more insulin because the patient's own fat may be burning enough to produce acidosis. In treating diabetes one should never forget the endogenous sources of food.

After the diacetic acid disappears from the urine the amount of food is gradually increased up to the patient's maintenance diet, and enough insulin is given to keep the patient sugar free.

THE USE OF SODIUM BICARBONATE IN DIABETIC COMA

There is a difference of opinion among clinicians regarding the use of alkalis in coma. Joslin advises against its use, but he is almost alone in his position. Theoretically the alkalis should be helpful in combating acidosis, and many good clinicians believe in its use. One gram of sodium bicarbonate raises the carbon dioxid combining power of the blood plasma 1 per cent for each 84 pounds body weight. A patient in coma has a carbon dioxid below 30 volumes per cent. The normal carbon dioxid is about 70 volumes per cent. Therefore, there is a difference of 20 volumes per cent. That is, the carbon dioxid combining power of a patient in coma can be raised 50 volumes per cent without danger of alkalosis. One gram of sodium bicarbonate for every 84 pounds body weight raises the carbon dioxid 1 per cent. Therefore, 20 to 30 grams per 84 pounds

body weight may be given without raising the carbon dioxid above normal or producing alkalosis. In other words, a diabetic in coma, or threatened with coma, may take from one to two ounces of sodium bicarbonate in 24 hours, the amount given depending upon the weight of the patient. If the patient can swallow it may be given in teaspoonful doses in water every 2 or 3 hours. If the coma is profound the sodium bicarbonate may be given intravenously, in 5 per cent solution, either with or without the glucose.

DIET LISTS FOR DIABETICS

We have had frequent requests from general practitioners for diet lists for diabetics requiring the insulin treatment and have had to inform them that it is not possible to prepare a diet list that will suit all cases of diabetes; that each patient has to be dieted and treated with insulin according to his individual requirements, depending upon his age, height, weight, and upon the kind and amount of work he is doing. It is also important to consider the patient's general condition as well as to know whether or not he has acetone and diacetic acid in his urine. "What is one man's meat is another man's poison" is surely true in diabetes. For instance, if a patient has a large amount of fatty acids in his blood and tissues, the diet that the average diabetic needs would increase the acidosis and perhaps bring on coma.

The diet lists sent out by well meaning manufacturers and those given in certain text books enumerating the foods the diabetic may take and those in the "must not take" or "to be avoided" lists are almost as bad as letting the patient eat what he wants. No diet list is of value in diabetes unless it gives the quantities of food to be taken; and it is not possible to outline in any one diet sheet anything like the quantities of the various foods needed by diabetics of all ages, weights and conditions.

We have prepared a series of diet lists calculated for different ages and weights which will give an idea of the diet for the average diabetic of given ages and weights and which may serve as the basis for making the daily menus for patients near the same age and weight. If the diabetic weighs within 5 pounds, either above or below the weight given, the diet may be used without change. If his weight is 10 or 20 per cent more than the nearest weight given, an increase of 10 or 20 per cent can be added to all the articles on the diet given. If the patient weighs less than the nearest weight given, corresponding amounts may be deducted. The child or the young adult will require from one-half to two-thirds more protein than the person over forty, so that the protein may be increased or decreased according to the age of the patient.

The diets prepared have been arranged according to the formula of W. R. Campbell, of the University of Toronto, which we believe to be the most accurate method of estimating the diabetic's diet. Campbell's method is perhaps a little complicated for the physician who sees only a few diabetics a year. That employed by Joslin, i. e., 1 gram protein to 1 gram of carbohydrate and 3 grams of fat per kilo of body weight is simpler and is accurate enough for general use, though 2 grams of fat is enough in beginning the diebetic treatment. The physician should prepare the daily menus for his patient and prescribe them according to the patient's age and weight much as he varies the dose of medicine for children of various ages, who are supposed to vary in weight according to age.

In the diet lists here given the weight in the metric system is used in the first column, measure in ounces in the second, and in tablespoonfuls in the last column. Heaping tablespoonfuls of vegetables are used. Some clinicians insist that only the metric system should be used in dieting diabetics and that in all cases the patient should weigh and measure his food. Undoubtedly it is much more accurate to weigh and measure food in grams and cubic centimeters; and every diabetic who has money to buy and the intelligence to use the Chatillon or Hanson gram scales should own and use them. The scales and measuring glasses are on sale only in the medical centers and there are many diabetics of the indigent and ignorant classes who cannot buy scales or even learn diabetic arithmetic, and the next best thing is to outline diets for them in terms that they can understand. These

lists may offer some suggestions to diabetics of the first class until they have learned to weigh and measure their foods. It cannot be stressed too strongly, however, that the person who has diabetes severe enough to require insulin should learn diabetic arithmetic thoroughly, if possible. The mild diabetic, who has a comparatively high sugar tolerance, need not trouble to weigh his food after he has learned the approximate amounts of food he can take without throwing down sugar in the urine.

The diet lists here given are calculated for the basal diet, which is the minimum amount that a person of given weight should have while at rest. Following the lists will be suggestions regarding the raises in diet up to the optimal diet, i. e., the amount of food required to keep a person of given weight in good physical condition. Patients who can be given the optimal diet without having sugar in their urine do not need insulin. Those who do not become sugar free on their basal diet, after four or five days, should take enough insulin to remove the sugar from their urine and then raise their diets, increasing the insulin enough to keep the urine free from sugar.

SUGGESTIONS REGARDING RAISES IN DIET

Place the patient on the basal diet nearest his weight and examine the 24-hour specimen of urine each day for sugar and diacetic acid. If a 24-hour specimen cannot be obtained, examine the first morning specimen daily. If the patient becomes sugar free on a basal diet within 5 days, raise the diet 200 calories, first raise. If the patient does not become sugar free within 5 days, begin insulin treatment.

If the patient remains sugar free on the raised diet (200 calories above basal) for 3 days, raise the diet another 200 calories, second raise, examining urine each day for sugar. The raises are continued, waiting three days between each to be sure the patient is not going to excrete sugar on the diet given him, until he has reached a diet sufficiently high to maintain his weight or bring him up to weight if underweight, to prevent excessive fatigue and supply sufficient energy for the physical exertion required by his daily duties.

Three to four hundred calories above the basal diet are usually sufficient for a stenographer, secretary or housewife with light duties; 400 to 500 calories above the basal diet for a housewife, school teacher, clerk or office man not doing much physical exercise; 500 to 800 calories above the basal diet for an active office position, active business or professional man or housekeeper, motormen or street car conductors or other moderately active laborers; 700 to 1000 calories above the basal diet for very active business and professional men, laborers or bench mechanics or growing boys, 8 to 14 years old, going to school; 1000 to 2000 calories above the basal diet for a farmer, blacksmith, bricklayer, mechanic or laborer at heavy work, or an active, growing boy going to school, 14 to 18 years old.

The calories required vary with the individual. The best guide is to maintain the patient's weight 5 to 10 pounds below his normal weight, and feed him sufficient calories to prevent excessive fatigue. The first raises are given in the form of 5 gm. of carbohydrates and 20 of fat, 200 calories, until the diet reaches 400 calories above the calculated basal diet. The next three or four raises are given in protein 8 gm. and fat 10 gm., 120 calories; then subsequent raises alternating 5 of carbohydrate, 20 of fat and then 8 of protein and 10 of fat.

ADJUSTING THE INSULIN DOSAGE

(1) If the patient continues to show sugar in the urine, or to have a high blood sugar, though sugar free in the urine, at the end of five days, while on his basal diet, insulin is begun; or (2) if he shows sugar in the urine, or has a high sugar at the end of 3 days following a raise in diet, insulin is begun.

The diet is not raised while the patient is showing sugar, but only when he is sugar free, both with or without insulin, irrespective of the time it takes to free him of sugar. The diet may be raised as soon as the patient is sugar free whether he is taking insulin or not.

The initial dose of insulin for (1) or (2) above is 2 units, increasing 2 to 5 units

DIET FOR A CHILD AGE 3 WEIGHING 32 POUNDS

Diet No. 1.—For use in beginning the treatment of a diabetic child, age 3 years; height, 35 inches; weight, 32 lbs. (14½ kilograms).

Estimated Basal Diet: Carbohydrates 21 grams; Proteins, 26 grams; Fats, 72 grams. Total Calories, 845.

AMOUNT Gms.	AMOUNT Oz.	AMOUNT Tablespoons	FOOD	FOOD VALUE Ch.	Prot.	Fat	Cals.
			BREAKFAST				
60	2	4	Milk	3	2	2	38
30	1	2	Cream	1	1	6	62
			Egg, one	0	6	6	78
15			Butter, 1½ pat on egg	0	0	13	117
			10:00 A. M.				
30	1	2	Orange juice in water	2	0	0	8
			or				
30			¼ scraped apple				
			1 cup broth or soup, clear				
				6	9	27	303
			DINNER				
			1 cup soup, chicken broth, bouillon or strained vegetable soup	0	0	0	
60	2	4	Milk	3	2	2	38
30		1	Minced chicken or scraped beef	0	7	2	46
30	1	2	Cream	1	1	6	62
15			Butter, 1½ pat	0	0	13	117
60		2	3% vegetables: okra, spinach, celery, tomatoes or 1 tbsp. peas	3	0	0	12
				7	10	23	275
			3:00 P. M.				
30	1	2	Orange juice in water,				
30			or ¼ scraped apple	2	0	0	8
			1 cup broth or soup				
			SUPPER				
			Soup or broth				
			Custard—				
			½ egg	0	3	3	39
			½ oz. cream	2	1	1	21
			½ oz. milk	0	0	3	27
30	1	2	Cream	1	1	6	62
60	2	4	Buttermilk	3	2	0	20
10			Butter, 1 pat	0	0	9	81
			Total	8	7	22	258
			Actual food intake for the 24 hours	21	26	72	836

Suggestions for Raising Diet of 3 Year Old Diabetic Weighing 32 Pounds (14½ K)

First Raise—usually after 3 to 5 days

To breakfast add:	C	P	F	Cals
1 oz. milk	2	1	1	21
1 oz. cream	1	1	6	62
½ pat butter, 5 gms.	0	0	4	36
	3	2	11	119

Second Raise—usually 8 to 10 days after treatment has been begun

To dinner add:

Same as first raise, 119 cals.

Third Raise—12 to 15 days after treatment has been begun

To supper add:

Same as first raise, 119 cals.

Fourth Raise—usually bringing patient to optimal diet

To dinner add:	C	P	F	Cals
30 gms.—1 tbsp.—minced chicken or scraped beef	0	7	2	46
Cream, 1 oz.	1	1	6	62
	1	8	8	108

It will be noted that the four raises increase the diet by about 470 calories, which, added to the basal diet, gives the total calories at about 1300, which is quite enough to increase the weight and vigor of the average 3-year-old child. The child is kept on this diet, either with or without the insulin, so long as it continues to maintain the proper rate of growth. The diet is then further increased as above described.

DIET FOR CHILD AGE 12 WEIGHING 80 POUNDS

Diet No. 2.—For use in beginning the treatment of a diabetic child, age 12 years; height, 5 feet 5 inches; weight, 80 lbs. (36 kilograms).

Estimated Basal Diet: Carbohydrates, 40; Proteins, 54; Fats, 133. Total Calories, 1573.

AMOUNT Gms.	AMOUNT Oz.	AMOUNT Tablespoons	FOOD	FOOD VALUE Ch.	Prot.	Fat	Cals.
			BREAKFAST				
			½ grapefruit, or ½ orange, or ½ baked apple, or ½ peach	5	0	0	20
90	3	6	Cream 20 per cent	4	2	17	177
			1 egg	0	6	6	78
20			Butter (on egg) 2 pats	0	0	17	153
			Bran biscuit, diabetic	0	0	0	0
15			Bacon, 3 crisp slices (take off 1 oz. cream from dinner or sup.)				
				9	8	40	428
			DINNER				
			Broth, clear, or strained vegetable soup	0	0	0	
80			Fowl or meat or fish 3 x 4 x ½ inches (medium fat)	0	18	12	180
100			5% vegetable	5	0	0	20
20			Butter, 2 pats on vegetable	0	0	17	153
30		1	Cottage cheese, or				
25			Lean meat 2 x 2 x ½ inches, or	1	6	0	28
6			Gelatin (jelly) 1 tsp.				
90	3	6	Cream 20%	4	2	17	177
			Fruit, as breakfast	5	0	0	20
			Bran biscuit, diabetic	0	0	0	0
				15	26	46	578
			SUPPER				
			Broth, clear or strained vegetable soup	0	0	0	
50			2 eggs or meat (medium fat, 3 x 3 x ½ inches)	0	12	12	156
15	½	1	and cream				
100		3	5% vegetable as salad	5	0	0	20
			Diabetic mayonnaise	0	0	0	0
30		1	Cottage cheese, or				
6			Gelatine (jelly) 1 tsp.	1	6	0	28
25			or lean meat 2 x 2 x ½ inches				
90	3	6	Cream	4	2	17	177
20			Butter, 2 pats	0	0	17	153
			Fruit as breakfast	5	0	0	20
			Bran biscuit, diabetic	0	0	0	0
			Total	15	20	46	554
			Actual food intake for the 24 hours	39	54	132	1560

Suggestions for Raising Diet of 12-Year-Old Diabetic Weighing 80 Lbs. (36 K)

First Raise—add to breakfast	C	P	F	Cals
Two teaspoonfuls (5 gms.) oatmeal dry, measure before cooking	3	0	0	12
Or 100 gms. 5% vegetable, 3 tbsp., and cream 2 oz., 4 tbsp.	2	1	11	111
To supper, 1 pat butter, 10 gms.	0	0	9	81
	5	1	20	204

Second Raise—add to breakfast	C	P	F	Cals
Two teaspoonfuls (5 gms.) oatmeal dry, measure before cooking, Or 60 gms., 2 tbsps., 5% vegetable, Or 50 gms., 1½ tbsps. 10% vegetable, Or ½ grape fruit	3	1	0	16
And add to dinner: 2 oz. cream, 4 tbsps.	2	1	11	111
and 1 pat butter, 10 gms.	0	0	9	81
	5	2	20	208

Third Raise—add to breakfast	C	P	F	Cals
1 egg	0	6	6	78
Bacon, lean, 2 slices, crisp	0	2	5	53
	0	8	11	131

Fourth Raise—add to supper	C	P	F	Cals
60 gms., 2 tbsps. 5% vegetable	3	0	0	12
Or 30 gms., 1 tbsps. 10% vegetable, and cream 2 oz. (4 tbsps.)	2	1	11	111
and 1 pat butter, 10 gms.	0	0	9	81
	5	1	20	204

Fifth Raise—add to dinner	C	P	F	Cals
Meat, fish or fowl (30 gms.) 3 x 2 x½ inches	0	8	5	77
½ pat butter	0	0	5	45
	0	8	10	122

DIET FOR YOUNG ADULT WEIGHING 124 POUNDS

Diet No. 3.—For use in beginning the treatment of boy or girl diabetic, age 16 years, or young adult; height 5 feet 5½ inches; weight, 124 lbs. (56 kilograms).

Estimated Basal Diet: Carbohydrates, 48; Proteins, 75; Fats, 162. Calories, 1950.

AMOUNT			FOOD	FOOD VALUE			
Gms.	Oz.	Tablespoons	BREAKFAST	Ch.	Prot.	Fat	Cals.
			½ grapefruit or ½ orange or ½ peach or ½ baked apple	5	0	0	20
			2 eggs	0	12	12	156
15			Bacon (crisp) 4 slices	0	2	10	98
20			Butter 2 pats (on eggs or biscuit)	0	0	18	162
90	3	6	Cream 20%	4	2	17	177
10		1	Oatmeal, dry (measure before cooking)	7	2	1	45
				16	18	58	658
			DINNER				
			Broth, clear, bouillon or strained vegetable soup	0	0	0	
			2 eggs or				
50			Meat, fowl or fish 3 x 3½ inches				
15	½	1	and cream	0	12	12	156
100		3	5% vegetables, salad (lettuce, tomato, celery)	5	0	0	20
90	3	6	Cream 20%	4	2	17	177
20			Butter, 2 pats	0	0	18	162
20		1	Cottage cheese or				
6			Gelatine (jelly) 1 tsp.	0	6	0	24
			Fruit as breakfast	5	0	0	20
			Bran biscuits, diabetic	0	0	0	0
				14	20	47	559
			SUPPER				
			Broth or clear soup or strained vegetable soup	0	0	0	
			Bran biscuits, diabetic	0	0	0	
150			Meat or fowl or fish 5 x 4 x ½ inches (medium fat)	0	33	20	312
200		6	5% vegetables	10	0	0	40
20			Butter, 2 pats	0	0	18	162
90	3	6	Cream 20%	4	2	17	177
			Fruit, as breakfast	5	0	0	20
			Total	19	35	55	711
			Actual food intake for the 24 hours	49	73	160	1928

Suggestions for Raising Diet of Boy or Girl or Young Adult Weighing 124 Lbs. (56 K)

First Raise—add to breakfast	C	P	F	Cals
2 tsp. (5 gms.) oatmeal (weigh dry before cooking)				
Or 100 gms. 3% vegetable	3	0	0	12
To supper add:				
1 pat butter	0	0	8	72
To breakfast add:				
2 oz. cream	2	1	11	111
	5	1	19	195

Second Raise—add to supper	C	P	F	Cals
Meat, 30 gms., 5 x 1 x ½ inches	0	8	5	77
Cream, ½ oz.	1	0	5	49
	1	8	10	126

Third Raise—add to dinner	C	P	F	Cals
½ orange, or ½ grape fruit, or ½ baked apple, or 2½ tbsps. 5% vegetable, or 1 tbsps. 10% vegetable	3	0	0	12
and cream, 2 oz.	2	1	11	111
and butter, 1 pat	0	0	9	81
	5	1	20	204

Fourth Raise—add to supper	C	P	F	Cals
Custard—1 egg	0	6	6	78
1½ oz. milk	2	2	3	43
	2	8	9	121

Fifth Raise—add to dinner
(Same as third raise)

DIET FOR ADULT DIABETIC WEIGHING 132 POUNDS

Diet No. 4.—For use in beginning the treatment of adult diabetics, height 5 feet 7 inches, weighing 132 lbs. (60 kilograms).

Estimated Basal Diet: Carbohydrates, 41; Proteins, 43; Fats, 144. Calories, 1630.

AMOUNT			FOOD	FOOD VALUE			
Gms.	Oz.	Tablespoons	BREAKFAST	Ch.	Prot.	Fat	Cals.
			½ grapefruit or ½ baked apple or ½ orange or ½ peach	5	0	0	20
			2 eggs	0	12	12	156
20			Butter on eggs, 2 pats	0	0	17	153
15			Bacon (crisp), 4 slices	0	2	10	98
90	3	6	Cream	4	1	17	173
			Diabetic bran biscuits	0	0	0	
				9	15	56	600
			DINNER				
			Broth, clear soup, bouillon or strained vegetable soup	0	0	0	
50			Fowl, fish or meat 5 x 2 x ½ inches (medium fat)	0	11	8	116
200		6	5% vegetable	10	0	0	40
20			Butter, 2 pats on vegetables or biscuit	0	0	17	153
90	3	6	Cream 20%	4	2	17	177
			Fruit as breakfast	5	0	0	20
			(1 oz. cream may be whipped for fruit)				
			Diabetic bran biscuits	0	0	0	
				19	13	42	506
			SUPPER				
			Soup or bouillon				
50			Lean pork or ham 5 x 2 x ½ inches or 2 eggs	0	12	12	156
100		3	5% vegetables as salad (celery, lettuce, tomato)	5	0	0	20
90	3	6	Cream	4	2	17	177
20			Butter, 2 pats on eggs or brans	0	0	17	153
			Fruit as breakfast	5	0	0	20
			Diabetic bran biscuits	0	0	0	
			Total	14	14	46	526
			Actual food intake for the 24 hours	42	42	144	1632

Suggestions for Raising Diet of Adult Weighing 132 Lbs. (60 K)

First Raise—add to breakfast	C	P	F	Cals
Oatmeal, 3 tsp. (6 gms.—dry, measure before cooking)	4	1	0	20
Cream, 2 oz., 4 tbsps.	2	0	11	107
Bacon, 2 slices, 10 gms.	0	1	8	76
	6	2	19	203

Second Raise—add to supper	C	P	F	Cals
5% vegetable 60 gms., 2 tbsps.	3	0	0	12
2 oz. cream, 4 tbsps.	3	1	11	115
1 pat butter	0	0	8	72
	6	1	19	199

Third Raise—add to dinner	C	P	F	Cals
Meat fish or fowl (20 gms.) 3 x 2 x ½ inches	0	8	5	77
1 pat butter	0	0	5	45
	0	8	10	122

Fourth Raise—add to breakfast	C	P	F	Cals
Oatmeal, 3 tbsps. (6 gms., dry, measure before cooking)				
Or ½ orange, or ½ apple, or ½ grape fruit	4	1	0	20
and 1 pat butter	0	0	8	72
and add to dinner 2 oz. cream, 4 tbsps.	2	1	11	111
	6	2	19	203

Fifth Raise—add to supper	C	P	F	Cals
1 egg	0	6	6	78
Bacon or fat ham, 10 gms. 3 x 3 x ¼ inches	0	2	4	44
	0	8	10	122

Sixth Raise—add to dinner	C	P	F	Cals
Custard composed of				
1 egg	0	6	6	78
1 oz cream, 4 tbsps.	1	1	6	62
1 oz. milk, 4 tbsps.	2	1	1	21
and 1 pat butter	0	0	9	81
	3	8	22	242

DIET FOR DIABETIC WEIGHING 154 POUNDS

Diet No. 5.—For use in beginning the treatment of adult diabetics, height 5 feet 6 inches, weighing 154 lbs. (70 kilograms).

Estimated Basal Diet: Carbohydrates, 40; Proteins, 54; Fats, 140. Calories, 1644.

AMOUNT			FOOD	FOOD VALUE			
Gms.	Oz.	Table-spoons	BREAKFAST	Ch.	Prot.	Fat	Cals.
			½ grapefruit, ½ orange, ½ peach or ½ baked apple	5	0	0	20
			2 eggs	0	12	12	156
15			Bacon (crisp), 4 slices	0	2	10	98
20			Butter on eggs, 2 pats	0	0	17	153
120	4	8	Cream, 20%	5	3	22	230
6			Oatmeal, 3 teasp. (measure dry before cooking)	5	0	0	20
			Diabetic bran biscuit				
				15	17	61	677
			DINNER				
			Broth, bouillon, clear or strained vegetable soup	0	0	0	
75			Meat, fowl or fish 3 x 4 x ½ inches (medium fat)	0	16	12	172
100			5% vegetables	5	0	0	20
20			Butter, 2 pats	0	0	17	153
60	2	4	Cream, 20%	3	1	11	115
6			Gelatine 1 tsp. (measure before making jelly)	0	6	0	24
			Fruit, same as breakfast	5	0	0	20
			(Cream may be whipped for jelly and fruit)				
			Diabetic bran biscuit				
				13	23	40	504
			SUPPER				
			Soup, same as dinner	0	0	0	
50			Meat, fowl or fish 4 x 2 x ½ inches (medium fat)				
			or				
20		1	1 egg and cottage cheese		11	7	107
100		3	5% vegetables as salad (celery, lettuce, tomatoes, etc.)	4	0	0	16
			Diabetic mayonnaise	0	0	0	0
90	3	6	Cream, 20%	4	2	17	177
20			Butter, 2 pats	0	0	17	153
			Fruit, same as breakfast	5	0	0	20
			Diabetic bran biscuits	0	0	0	0
			Total	13	13	41	473
			Actual food intake for the 24 hours	41	53	142	1654

Suggestions for raising diet of adult weighing 154 lbs. (70 kilograms). (Same as for 56 kilograms. See page 169.)

every 3 days until the patient is sugar free when the diet may be raised, or the insulin reduced 2 to 5 units, as it does not require as much insulin to maintain the patient sugar free as it does to reduce his blood sugar to normal and urine sugar free after he has been showing sugar over an extended period.

With subsequent raises in diet in a patient already taking insulin, the insulin is increased 2 to 5 units every 3 or 4 days. When the patient remains free during that period an additional raise in diet and in insulin may be carried out.

VARYING THE DIABETIC'S DIET

Eggs may be served in any form, preferably not fried: e. g., an omelet of 2 eggs, with 1 or 2 strips of bacon (minced) and

DIET FOR DIABETIC WEIGHING 176 POUNDS

Diet No. 6.—For use in beginning the treatment of adult diabetics, height 5 feet 6 inches, weighing 176 lbs. (80 kilograms).

Estimated Basal Diet: Carbohydrates, 42; Proteins, 60; Fats, 148. Calories, 1740.

AMOUNT			FOOD	FOOD VALUE			
Gms.	Oz.	Tablespoons	BREAKFAST	Ch.	Prot.	Fat	Cals.
			½ grapefruit or ½ orange or ½ peach or ½ baked apple	5	0	0	20
			2 eggs	0	12	12	156
15			Bacon (crisp), 4 slices	0	2	10	98
90	3	6	Cream, 20%	4	2	17	177
20			Butter, 2 pats	0	0	17	153
6			Oatmeal 3 teasp. (measure dry before cooking)	5	0	0	20
				14	16	56	624
			DINNER				
			Broth, bouillon or clear or strained vegetable soup	0	0	0	0
75			Fowl or meat or fish 3 x 4 x ½ inches (medium fat)	0	16	12	172
100			5% vegetable	5	0	0	20
20			Butter, 2 pats	0	0	17	153
90	3	6	Cream, 20%	4	2	17	177
25		1	Cottage cheese, or				
6			Gelatine 1 teaspoonful (measure before making jelly)	0	6	0	24
			Fruit as breakfast	5	0	0	20
				14	24	46	566
			SUPPER				
			Broth as dinner	0	0	0	
			Meat or fish or fowl 5 x 2 x ½ inches or 2 eggs with cottage				
25		1	cheese (1 tbsp.); Or gelatine (jelly)	0	18	12	180
100		3	5% vegetables as salad	5	0	0	20
			Diabetic mayonnaise	0	0	0	0
20			Butter, 2 pats	0	0	17	153
			Fruit as breakfast	5	0	0	20
90	3	6	Cream, 20%	4	2	17	177
			Total	14	20	46	550
			Actual food intake for the 24 hours	42	60	148	1740

Suggestions for raising diet of adult diabetic, weighing 176 lbs. (80 kilograms). (Same as for 56 kilograms; see page 169.)

For obese diabetics weighing more than 175 pounds, the last diet may be used because it is desirable for them to lose flesh. In some very stout persons it is better to use even less fat than for the 175 pound diet, because they have a large endogenous supply of oleaginous food which needs to be consumed. In some obese diabetics it is necessary to increase the carbohydrates and push the insulin to prevent them from developing acidosis from burning their own fat. The protein in any adult diet should not be carried above 75 grams except in persons doing extreme physical exercise such as a blacksmith or farmer.

a little sliced tomato forms a change.

Cream (1) May be added to soup
(2) May be used with egg to make custard
(3) May be whipped and served on fruit or jelly

Fish, when substituted for meat, should have 1 pat of butter on each serving to make up the fat (except salmon).

Ten per cent vegetables may be substituted for 5 per cent vegetables, using one-half the quantity prescribed. Tablespoonfuls of vegetables prescribed in diets are heaping tablespoonfuls.

Any kind of meat may be used: beef, steak, roasts, mutton, lamb, pork, sausage, cold ham. In using pork, serve lean pork. In using beef, serve a medium fat

portion, as the fat content of pork is high and of beef low.

Oysters, lobster, shrimp or any sea food may be used, serving 1 pat of butter with each serving to make up the fat. Oysters are only one-third value in protein of meat, therefore 3 times the quantity prescribed for meat may be used.

THE 5 AND 10 PER CENT VEGETABLES AND FRUITS

The following is a list of 5 and 10 per cent vegetables and fruits which may be substituted in the above diets:

5 PER CENT VEGETABLES

Lettuce	Brussells sprouts
Cucumbers	Watercress
Spinach	Okra
Turnip greens	Cauliflower
Beet greens	Egg plant
String beans	Cabbage
Asparagus	Radishes
Vegetable marrow	Leeks
Sauer kraut	Mushrooms
Celery	Pumpkins
Tomatoes	Turnips

10 PER CENT VEGETABLES

Squash	Parsnips
Beets	Peas (canned)
Carrots	(Discard fluid in can)
Onions	

10 PER CENT FRUITS

Watermelon	Pineapple
Strawberries	Blackberries
Lemons	Gooseberries
Cranberries	Oranges
Peaches	

NOTE.—In using 10 per cent vegetables use one-half quantity prescribed for 5 per cent vegetables.

I desire to express an appreciation of my confreres, Dr. J. P. Chapman, Dr. W. S. Geddes and Miss Thelma Greene, for their assistance in estimating and calculating food values in these diets and for suggestions that have aided me greatly in the preparation of this paper.
804-810 Empire Bldg.

DISCUSSION—SYMPOSIUM ON INSULIN

Papers of Dr. Woodyatt, Dr. Paullin and Dr. Harris.

Dr. A. L. Walters, Indianapolis, Ind.—Tomorrow is the thirty-second birthday of Dr. Frederick Banting, to whose original idea is due the isolation of insulin. Dr. Banting has been accorded, with Prof. MacLeod, the highest honor to which a physician can aspire, the award of the Nobel prize. This reward, officially given to Dr. Banting and Prof. MacLeod, has been justly shared by them with Mr. Best and Dr. Collip.

The idea leading to the discovery of insulin originated with Dr. Banting, and he would be the first to acknowledge that its rapid development was due not to individual effort but to team work.

In November, 1920, the idea of isolating this hormone was conceived. In May, 1921, laboratory experiments were started. In January, 1922, after many successful animal tests, the first injection was given to a patient having diabetes. This and subsequent injections in other patients improved the diabetic condition, but often caused irritation and severe inflammation and sometimes abscess formation, due to the large amount of solids—fats, proteins and salts, which the product contained.

In June, 1922, the Research Laboratories of Eli Lilly & Co. were invited to collaborate in the further development of this product. Four main problems presented themselves: purification, stabilization, standardization and economical large scale production. It is gratifying to say that these problems have been solved.

Insulin as first produced and used in Canada contained 50 milligrams of solids per unit and was not stable. Often it lost strength rapidly. Iletin or insulin, Lilly, as at present supplied, contains only 0.05 milligram of solids per unit and keeps with no apparent loss of strength for an indefinite time even at room temperature. Standardization of the product is accomplished with extreme care. Nevertheless it is liable to the same percentage of error inherent in any biological test. Each lot manufactured is tested on a large number of rabbits at Indianapolis and is subsequently tested on animals in the Toronto laboratories. Each lot is then submitted to clinical trial in ten or more hospital clinics before it is given its final value and made generally available. The production of iletin in a large way has succeeded so that it is now available to all, not only in this country but abroad.

When one stops to consider that at the meeting of this Association in Hot Springs two years ago insulin was unknown, except to one physic an present, and that today approximately 30,000 patients have received this treatment, that many of them are living who would otherwise be dead, many of them are working or playing who would otherwise be invalids, one begins to appreciate the remarkable achievement.

This achievement, however, has not been accomplished by the workers at Toronto and Indianapolis alone, but by the splendid team work and early cooperation of eight clinics, seven in this country, including Dr. Woodyatt's, and one in Canada, and by the later clinical cooperation of a number of physicians, including your Chairman, the authors of these papers and the discussants who follow, as well as several members of this audience.

Diabetes is a disease of considerable prevalence. No community of any size is without it. Many cases need insulin to maintain health. Others do not. Many who deserve help cannot get it because, if I may be permitted to say so,

physicians generally have paid little attention to the study of dietetics. The treatment of diabetes is dietetic. Insulin is an adjunct and the administration of insulin is simple and easy to the physician who understands the dietary principles underlying the treatment of this disease.

If a diabetic patient, of no more than average intelligence, can be brought into a hospital and within ten days be taught the computation of proper diets and the test for sugar in the urine, and can then be entrusted with a hypodermic outfit and a bottle of insulin, it would not seem such a difficult problem for a trained physician to master the fundamentals of such a treatment. For this purpose he will require a list of food values, which may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., as Bulletin No. 28, "The Chemical Composition of American Food Materials," or such tables will be found in any book on diabetes. He will also require a few pieces of apparatus for determining quantitatively the daily excretion of sugar in the urine and for this purpose there are several simple methods. That of Benedict is perhaps simplest, quickest and best. Without this knowledge and simple equipment a diabetic should not be treated with insulin, or without it.

Blood sugar tests are helpful in diagnosis, often useful in treatment but seldom indispensable.

In closing may I say that the direct clinical results from the discovery and use of insulin are remarkable, but that as much may come from the numerous fields of research which it has opened, and from the great stimulus it has given to the study of diet in disease.

Dr. J. S. McLester, Birmingham, Ala.—There is nothing cryptic about the treatment of diabetes. Certain definite things are required of the physician, but these are not unduly formidable. First, he must understand the principles which underlie this treatment: the principles of minimal metabolism, of low protein intake, of carbohydrate restriction, of carbohydrate-fat ratio of safety, and of good hygiene. Second, he must take the trouble to gain a thorough understanding of food values and must use the requisite degree of patience in imparting this knowledge to the patient. I think it was Carlisle who said: "Genius is an infinite capacity for taking pains."

Has insulin more than a temporary influence? Has it any actual curative value? I recall the interesting work of Homans published some six or seven years ago, in which he was able to demonstrate, as the result of functional activity, certain microscopic changes in the islet cells which gave evidences of stimulation, exhaustion, regeneration, etc. He found that overstimulation such as accompanies hyperglycemia caused easily recognizable cell exhaustion and conversely that functional rest led to evidences of regeneration. If the sclerosis or other changes which involve the islet cells has not gone too far we can reasonably expect—and clinical experience demonstrates this—that rest will be followed in some measure at least by genuine restoration of function. Since, then, insulin permits this rest, may we not expect its administration to be accompanied by such improvement in function as will in time enable us to dispense with its use? Indications are that this is the case. I understand that at the Toronto Clinic they have in many instances with apparent success been able permanently to withdraw insulin. Whether this can ever be done in advanced cases is another question. Probably not.

The economic value of insulin to the patient, particularly if he is a wage earner, is sometimes an important consideration. Will a dollar spent for insulin enable him to perform an additional dollar's worth of work? Such considerations may appear sordid, but there are times when they force themselves upon us.

Dr. I. I. Lemann, New Orleans, La.—Dr. Walters has referred to a very important point in his discussion, namely, that if a layman of mediocre intelligence can learn in the course of ten days or two weeks how to calculate his diet, how to regulate his dose of insulin, and how to give a hypodermic so that he can treat himself with insulin, then it is an indictment of the profession for physicians in general to throw up their hands and say that the study of dietetics is beyond their ability. I have recently had under my care a boy of 8 years who, one morning in the course of my rounds, presented me with a sheet of paper upon which he had written the calculation of his diet for the following twenty-four hours. That boy knew some food values, had had enough education to handle the multiplication table and could manage his own diet. It is true that there were some inaccuracies in his calculation, but he had the principle.

We have also had this experience: we have rescued a man on the verge of coma only to find out afterwards that he was practically illiterate and had gone through only the fourth grade. However, his wife had gone through the sixth grade, and we found that we could train her to make the calculations as to diet and dosage of insulin.

We rescued a woman of about 45 from a profound coma to find that she could not read nor write. We found, on the other hand, that her husband had sufficient intelligence to manage the feeding. Certainly if a boy 8 years old, certainly if a man of the rank in society to marry an absolutely illiterate woman, certainly if a woman who has gone through only the sixth grade in the grammar school can manage a case of diabetes, the rank and file of the profession can learn to manage it. It is necessary, however, that the profession be impressed with the fact that its management is not, as some one has put it, cryptic. Unfortunately, too many of the communications have dealt with algebraic formulae so that the profession, I am afraid, is getting the impression that there is something mysterious about the calculations. That is not true, as has been repeatedly emphasized this afternoon. One has only to remember that a certain maintenance diet has to be calculated, based upon the weight of the patient multiplied by a certain number of calories to the kilo of body weight, and to that I

should add the requirement of a minimum amount of carbohydrate for a palatable diet. There is no use calculating a diet containing less than 40 grams of carbohydrate. Less than that makes an unbalanced diet and an unpalatable diet. If we have these facts fixed in our minds the management becomes very simple. One soon learns how to calculate a sufficient amount of insulin to keep the patient with a urine free of sugar. Complicated laboratory methods may be put aside as desirable for further investigation, but as not necessary for the man in general practice.

Dr. John C. Hemmeter, Baltimore, Md.—It has been known that fish have very well developed islands of Langerhans and that when they are depancreatized the excretion from the cloaca contains glucose. In consequence of the large increase of diabetes, probably as a result of the insulin treatment's being known, and the average life of four and a half years for these patients being lengthened by the use of insulin, the number of diabetics will be constantly increasing, making more and more demand upon the manufacturers of insulin. In certain fish, particularly one, Lophius piscatorius, the islands of Langerhans do not exist in the pancreas, but do exist as separate organs. In one large fish which is found at Woodshole, Mass., there are eighteen of these organs. The Lophius piscatorius is a yard long and 12 to 18 inches in width. It contains 18 organs, one of them particularly large, which one might call the principal islet, and which is the organ for the control of carbohydrate metabolism. This organ, extracted in Ringer's solution, has a very potent antidiabetic substance in it. This substance is effective when taken by mouth, but one has to give the animal 9.5 times as much as would be necessary taken hypodermically.

I was very interested in what Dr. Woodyatt said about a case of diabetes where the glucose increased after a dose of insulin. For a long time I have suspected that there is another factor at work in the metabolism of carbohydrate by insulin other than this catalyst. I wonder if there is an amboceptor present necessary to anchor the insulin to the sugar molecule or whether under physiologic conditions the insulin is secreted by the islands of Langerhans in an inactive form and requires activation to exert its specific effect.

Dr. William S. McCann, Baltimore, Md.—The maintenance of discipline depends upon the instruction of the patient, who must be taught how to make menus, weigh foods and cook them properly. These things can be learned by any one, and discipline will usually be maintained by a patient who has been properly instructed.

Insulin has so eclipsed everything that has occurred in the way of progress in the treatment of diabetes that I think we are in danger of overlooking the very great debt which we owe to Dr. Woodyatt for establishing in this country a rational dieto-therapy for diabetes.

Dr. V. E. Simpson, Louisville, Ky. There is scarcely any debate as to the value of insulin to the juvenile diabetic. These cases have been so helpless that we welcome anything that will enable the children to take a maintenance diet and become active citizens of the state. Likewise, there is scarcely any discussion as to the use of insulin where there is coma, or the conditions that immediately precede its development. The institution of insulin there is a life saver. The methods of use of insulin in such conditions may vary, but the fundamental principle underlying any plan of procedure is simply this: bear in mind that the fat in the body which has undergone partial oxidation is the cause of the trouble; that fat will burn in a carbohydrate flame only; that if you use enough insulin to bring up the level of oxidation sufficiently, the fat will burn and the symptoms will inevitably subside.

The question as to whether the so-called mild diabetic will be benefited by insulin is exceedingly interesting and alluring. I personally believe that the Maker, when He fixed the normal limits of blood sugar, knew pretty well what He was about. If that be true, then the mild diabetic who on a reasonably sufficient diet to satisfy his needs still maintains a blood sugar well above normal limits, his body cells functioning under this increased blood sugar, no matter how much or how little, is just to that extent being handicapped in the proper functioning of his cell structure. I believe these cases should be given the benefit that insulin offers to enable them to take a normal diet and enable the pancreas to secure the rest which we believe is highly beneficial.

Do they get well? If 10 per cent of the cells of the islands are totally destroyed by the diseased process, we know of nothing that will restore that 10 per cent. But 90 per cent, we will say, of the cells functioning have also lost part of their ability to do their work, and if you can, by the rest that insulin gives, enable this 90 per cent to regain their normal ability to do work, they may in addition be able to do a little more. In other words, you can have a compensatory reaction of the cells. It is hoped that the remaining cells of the islands which are still physiologically well, not having been destroyed by pathological processes, will be restored by this rest to a degree of activity which will enable them to carry on. I believe that these patients should be hospitalized in the beginning of their treatment for ten days or two weeks. No man can treat these cases with any degree of satisfaction and safety to his patient unless he has the facilities of a laboratory that can do blood sugar work. After the dose of insulin has been standardized, the patient can return to his home, having been educated as to the arrangement of the diet, insulin dosage, and examination of the urine for sugar.

While much stress has been laid on urine sugar, very little has been said of blood sugar and its respective value. A man may have a high renal threshold and his blood sugar may rise to 250 milligrams, with no urinary sugar appearing. A nephritic condition will raise the level of the threshold, and a disappearance of urine sugar be

no indication of the hyperglycemia that is obtaining in that individual.

That the physician without laboratory facilities can and should supervise the management of a diabetic after sugar tolerance and insulin dosage have been determined by one who commands such facilities need not be gainsaid. But I do not believe any diabetic, except as an emergency in coma, should be given insulin who has not been studied on a weighed diet of known sugar content, blood sugar estimations made, renal threshold ascertained, sugar tolerance estimated and urinary loss accurately determined.

Glycosuria does not necessarily mean diabetes. There are many cases of low sugar tolerance; there are a few cases of real renal glycosuria and there is the group of glycosurias of endocrine origin. These must be differentiated from the true diabetics and it cannot be done by urine examinations alone.

I am constrained to add that some of the opinions voiced here today will prove productive of harm to both diabetics and non-diabetics. The tendency to such unscientific management of these metabolic disturbances thus encouraged is as unfortunate as incompetent surgery.

Dr. Woodyatt (closing).—I would not give the impression that in these cases an increase of sugar following a dose of insulin is necessarily a regular performance. It happened in this case. The blood sugar precentage might be a little lower on the lower diets or the same as on the higher. I lay no stress on the fact that in this case the blood sugar was lower on the high diet.

I am not very familiar with the reactions of the substance that is isolated from certain fishes which corresponds to that found in the mammalian islands of Langerhans. Dr. MacLeod extracted a substance from the angler fish, Lophius piscatorius, and they used it in Toronto. They regarded it as identical physiologically, so far as I know, with the insulin prepared from other sources.

I would endorse what Dr. McCann said with respect to the use of insulin by men in general practice. It is not a question to make any issue of. There is nothing mysterious about insulin. A man should be trained and know what he is doing before he undertakes to use insulin as he must be trained to use drugs or to do a surgical operation. I think it is absurd to say that a patient in two weeks may learn all about the administration of insulin. A patient under the direction of a doctor, telling him what he needs for his own particular case, and to whom he may go for further help from time to time, can learn to execute certain orders, but it would be very erroneous to believe that that patient would be safe to direct the treatment of other cases of different sorts in all stages of diabetes as a physician does. Insulin must go into the hands of the general practitioner, but the practitioner must qualify himself to use it safely and well and there is something to learn.

Dr. Paullin (closing).—There is very little to add to what has been said on this subject. It is not intended that the patient should be taught all about the administration of insulin, but that he be taught the use of insulin in his particular case, the dosage required, the reaction which is liable to occur, and the necessity for communicating with the physician in charge as to any symptoms that might occur.

I would like to emphasize again what Dr. McCann has said regarding the fact that Dr. Woodyatt has added greatly to our knowledge of handling diabetics by the very scholarly and scientific way in which he has taught us the value of the various food products, the ratio between the carbohydrate and fat and protein in the diet of these individuals.

Dr. Harris (closing).—The first and most important thing in the treatment of coma is to determine whether or not it is due to diabetes. Last week a child was brought into a hospital in Birmingham with the diagnosis of intestinal obstruction. There was no evidence of diabetes until the child's urine was examined by the surgeon, before the operation, when it was found to be loaded with sugar and ketone bodies. The obstinate constipation in diabetic coma may be diagnosed as intestinal obstruction. In another case the question was considered as to whether or not it was appendicitis with ruptured appendix or diabetic coma. Abdominal pain, fever and marked tenderness and rigidity of the abdominal muscles are not infrequent symptoms of acidosis in the beginning of coma. I saw one case of diabetic coma in which there was almost a perfect picture of appendicitis plus drowsiness and then coma.

I saw in Dr. Woodyatt's clinic last summer a patient who had been given 100 units of insulin by her home physician. The urine had not been examined for sugar at all by her family physician. Examination by Dr. Woodyatt's assistant showed no sugar in the urine and the blood sugar was about normal. It was a case of uremia. I had a case sent me in which the tendency to coma was due to uremia and not to the diabetes. Joslin reports a case of apoplexy in which the patient was given insulin because the coma was thought to be due to diabetes.

A word as to the suggestion of Dr. Hemmeter, who expressed the hope that we may be able to give insulin by mouth. There is no hope of getting any form of insulin that can be administered by mouth. Dr. Banting told me that he had tried it in every way, by mouth, in enteric, capsules, through duodenal tube and per rectum, etc., and it gave no response. Insulin is destroyed by the gastric and intestinal secretions. Just a word of caution here against the advertised pancreatic extracts that are supposed to have some effect upon blood sugar. They are absolutely worthless, except the iletin gotten out by Lilly. Banting made an emulsion of a handful of the most blatantly advertised pancreatic extract and injected it into the veins of dogs, without any effect whatsoever on the animals' blood sugar.

SICKLE CELL ANEMIA*†

By V. P. SYDENSTRICKER, M.D.,
Augusta, Ga.

Sickle cell anemia was first observed by Herrick[1] in 1910. Between that time and 1923, only three additional reports appeared: those of Washburn,[2] Cook and Myer[3] and Mason,[4] each of whom reported one case. In August of this year, Sydenstricker, Mulherin and Houseal[5] reported two cases with one autopsy and observations on nine relatives of these patients. Huck[6] in October reported three cases with observations on seventeen of his patients' relatives. That the condition is much more common than the literature would indicate is obvious from the fact that forty cases have been recognized in our clinic during the past sixteen months. These cases, which will be reported elsewhere, furnish the basis for the following observations.

The condition is familial and hereditary, occurring indiscriminately as regards sex, and appearing in many members of affected families. It is characterized by the presence in the circulating blood or the development *in vitro* of poikilocytes of a definite and unmistakable form. Certain symptoms and physical signs are constant, namely, muscle and joint pains, abdominal crises, a peculiar scleral discoloration, general glandular enlargement, anemia and urobilinuria. Up to the present, all cases have occurred in negroes or mulattoes. Our youngest patient was three months old; our oldest, 67 years. Climate and geographical location probably have no significance.

Etiology.—Heredity probably accounts for all cases, although in our present state of knowledge we are not prepared to say that the disease may not be acquired. Emmel,[7] investigating Cook and Myer's case, observed sickling in the blood of the patient's father. A familial incidence was strongly suggested by the family history in this case and in the one reported by Washburn. Our cases I and II gave proof of the familial nature of the disease. The grandfather and father of Case I and his three brothers all showed characteristic blood changes. In the family of Case II, both parents and the only two siblings examined were affected. In two of Huck's cases numerous relatives showed sickling. Our series includes five more family groups. The dyscrasia undoubtedly follows Mendel's law and manifests itself as a dominant characteristic.

Symptoms.—The disease is recognizable in two phases which we have termed active and latent, according to the condition of the blood and the severity of the symptoms. In the active phase anemia is pronounced and many of the symptoms, especially dyspnea, palpitation and weakness, are referable to it. Pain, arthritic and muscular, without evidence of inflammation, is constant. Epigastric pain after eating and recurrent attacks of epigastric and left hypochondriac pain have been present in most cases and vomiting may occur. There is fever of low grade and night sweats are common. Exacerbations of these symptoms occur at intervals so that the history is one of remissions and relapses. Leg ulcer is a common complication.

In the latent phase, patients presenting no symptoms of anemia, on questioning will give a history of rheumatic attacks, pain in the epigastrium and left hypochondrium and periods of weakness and dyspnea which have been separated by years of normal health.

Physical Signs.—Like the symptoms, these vary with the stage of the disease. In active cases the patient is poorly developed and nourished. The apparent is much below the actual age. The sclerae present a characteristic greenish discoloration quite different from the muddy color so common in negroes and the yellow of biliary obstruction. The mucous membranes are pale, there is hypertrophy of the tonsils and the superficial lymph nodes are uniformly enlarged. The lungs frequently show evidence of pulmonary congestion. The heart is enlarged to the left, with a systolic murmur at the mitral area. The heart rate is accelerated and the blood

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pressure is low. The liver has been constantly enlarged in our active cases. The spleen has never been felt except in the presence of malaria. The genitalia are small. The extremities may show edema and ulcers or the scars of ulcers.

In latent cases the physical signs are much less striking. Scleral discoloration is always present and there is some general glandular enlargement. There are no

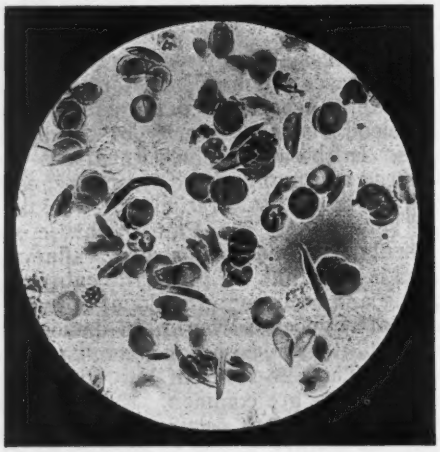

Fig. 1.—Fresh preparation from severe active case.

uniform pulmonary and cardiac findings. The liver is slightly enlarged. The spleen was felt seven times in thirty-two cases, only once when ordinary causes of splenomegaly could be eliminated. There is no retardation of development. Leg ulcers have been present in three of our latent cases.

The urine shows a low fixed specific gravity. The daily output is large and the excretion of phenolsulphonephthalein is reduced. Albumin is present in small amounts, urobilin is constantly present, and bile may occur in traces. The stools show nothing of significance.

The Blood.—There is no change in the coagulability. The red blood cells in our series have varied between 1,300,000 in a severe active case and 5,000,000 in a latent case. The hemoglobin varies with the red count, from 25 per cent to 90 per cent. The color index is high, usually approximating unity. The leucocytes are increased in number in active cases, from 11,000 to 64,000 in our series. In latent cases there is no leucocytosis. The platelets are moderately increased in both active and latent cases. The differential formula is not characteristic, though there is often an increase in the acidophilic and basophilic polymorphonuclears. A few myelocytes are present on most examinations.

The fresh blood presents the marked and characteristic morphological changes which give the disease its name. In active cases there are present elongated sickle-shaped and oat-shaped poikilocytes in numbers varying from 5 per cent to 40 per cent. These cells are darker, more highly refractile and more flexible than other cells. In stained smears they are darker and more dense. Stained smears show in addition to the diagnostic poikilocytes marked anisocytosis and polychromasia, with numerous blasts and many cells containing nuclear fragments. Nucleated sickle cells are occasionally seen. Cabot rings and Howell-Jolly bodies are rare. Large mononuclear cells containing phagocyted erythrocytes are always present in smears. The blood picture changes

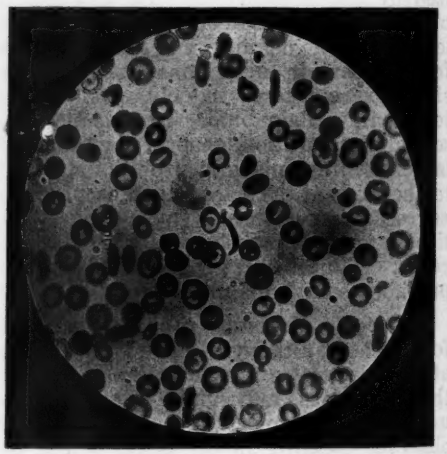

Fig. 2.—Stained blood smear from active case during remission.

with considerable rapidity as the disease fluctuates. During a relapse, sickle cells may compose 40 per cent of the total red count, and blasts are rare. Immediately before a remission, normoblastic crises oc-

cur and as the remission sets in sickle cells may almost disappear from the circulating blood. Anisocytosis and polychromasia persist, however, and some nucleated red cells are always present.

Fresh preparations sealed with petrolatum exhibit the remarkable changes first described by Emmel.[7] The sickle cells become more elongated and put out tenuous processes from their poles. The circular erythrocytes assume elongated crescentic and bizarre shapes and eventually become indistinguishable from the other cells.

In latent cases the fresh blood and stained smears show no changes beyond moderate anisocytosis and polychromasia. When, however, the blood is sealed under a coverslip, bizarre and crescentic forms appear within a few hours and increase in number until after twenty-four to thirty-six hours from 40 to 90 per cent of the cells have assumed sickle forms. This

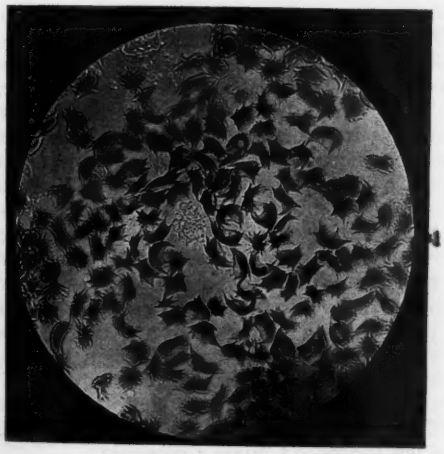

Fig. 3.—Sealed preparation of blood from latent case after 18 hours. (Fresh blood normal.)

phenomenon is the criterion by which latent cases may be recognized. In both active and latent sickle cell cases there is active phagocytosis of red cells in the sealed preparations.

In active sickle cell anemia the number of reticulocytes is increased, the percentages varying from 6 per cent to 30 per cent. In latent cases there is no increase. We have found no change in the fragility of the erythrocytes, though there has been a slight extension of the range of dilutions in which hemolysis occurs. The blood contains urobilin and bilirubin. Blood chemistry is negative with reference to the in-

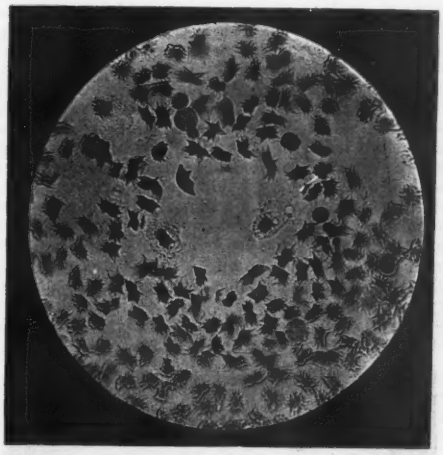

Fig. 4.—Phagocytes in sealed preparation of blood from latent case. (8 hours.)

organic constituents. The Wassermann reaction has been positive in only four of our cases.

Pathology.—Patients with sickle cell anemia die of intercurrent diseases so that the pathological picture is obscured. Only three necropsies have been performed.

The first to be reported was on our Case I, a child of six with active sickle cell anemia, a red count of 1,300,000, hemoglobin of 25 per cent and leucocyte count of 64,000.

The most interesting findings were in the heart, liver, spleen and bone marrow. The heart was hypertrophied, weighing 120 grams. There were no endocardial lesions. The liver was enlarged, weighing 690 grams. It presented the gross appearance of cloudy swelling. Microscopically the cords were swollen, the cells granular and there was much scattered, fine, dark-brown, iron-free pigmentation. The spleen was minute, measuring 5 x 3 x 1 cm. and weighing 7.9 grams. The capsule was thick, the malpighian bodies barely visible, the pulp diminished in amount and dotted with small hemorrhages. Microscopically the trabeculae were conspicuous, the parenchyma much reduced, the malpighian bodies inconspicuous, ill-defined and distorted. There were irregular areas of congestion and many hemorrhages of various sizes and ages. There was much free pigment scattered throughout. The kidneys showed subacute parenchymatous nephritis, with extensive iron-free pigmentation

of the tubular epithelium. There was simple hyperplasia of all the lymph glands examined. Sections of all the organs showed many sickle cells in the vessels.

The bone marrow was bright red and of normal consistency. Sections showed hyperplasia of both the erythrocytic and leucocytic elements. There were large numbers of sickle shaped red blood cells, often in large clusters between the capillaries. There was much brownish-black pigment in fine and coarse granules, mainly extracellular. Smears of the bone marrow stained with Wright's stain showed sickle and oat-shaped cells similar in all respects to those seen in the blood, but in relatively greater numbers. Erythroblasts of these forms were common, the nuclei being uniformly of the normoblastic type. In addition to sickle cells and nucleated sickle cells there were many filiform erythrocytes, long slender threads of erythrocytic elements, some so small as to suggest bacilli, others forty and fifty microns long. Occasional nucleated cells of this type were seen. There were also many erythrocytes and blasts of the most bizarre shapes, of all sizes up to 25 microns in diameter.

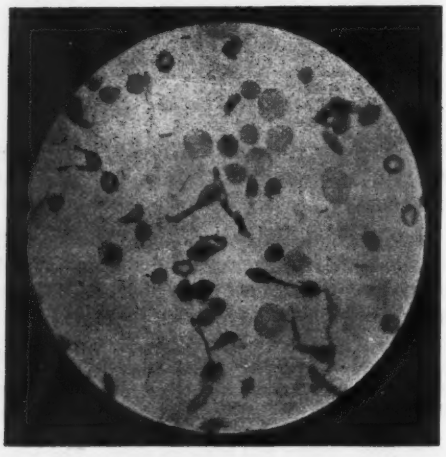

Fig. 5.—Smear from bone-marrow of severe active case, showing bizarre and filiform erythrocytes.

The second necropsy was that reported by Huck.[6] This patient was a man aged 24, with active sickle cell anemia, 2,208,000 erythrocytes, hemoglobin of 35 per cent and 10,700 leucocytes. It was noted that there was general lymphadenoid hyperplasia, atrophy of the spleen (which was only 2½ inches long) and hyperplasia of the bone marrow. Unfortunately the notes on this case were incomplete and no microscopic findings were recorded.

The third autopsy was our Case XXX, a man of 62 with latent sickling, a red count of 2,800,000, 45 per cent hemoglobin and 11,000 leucocytes. The findings of chief interest were: a deep yellow color of the fat, comparable to that seen in pernicious anemia, cloudy swelling and pigmentation of the liver, enlargement and multiple infarction of the spleen, and hyperplasia of the bone marrow. Microscopically, the liver cells were cloudy, with a marked increase in the number of nuclei, many of which were pycnotic. There was conspicuous pigmentation of the cells about the central and sublobular veins. The spleen was stuffed with blood, the malpighian bodies were very small and splenic pulp in the usual sense was not apparent, the spaces between the trabeculae and the malpighian bodies being filled with poorly preserved blood, of which more than half was in the spaces of the pulp. There was much coarse brownish and black pigment, especially conspicuous in the endothelial cells of the sinuses. The bone marrow showed an extreme degree of hyperplasia, both leucocytic and erythrocytic, with disappearance of the fat. There were some bizarre and elongated erythrocytes and blasts, but no changes comparable to those seen in Case I.

Pathogenesis.—In the light of the few observations which have been made any hypothesis is subject to revision. It is probable that there is a primary perversion of function of the hemopoietic organs. There has been hyperplasia of the bone marrow in the three cases examined post mortem, with unusual morphological changes in one case. There is increased blood destruction, as evidenced by the pigmentation of the tissues, the presence of bile pigments in the blood and the urobilinuria. It is probable that this is dependent on increased hemolytic activity on the part of the spleen. The spleen in all cases has shown grave lesions and an extract of the spleen from Case XXX showed extreme hemolytic activity. The hemorrhages and infarcts in the spleen may explain the recurrent attacks of high abdominal pain so frequent in this disease. What part phagocytosis plays in the production of the anemia is problematic. It is noteworthy, however, that the number of phagocytes in the peripheral blood is much increased during relapses.

Diagnosis.—This is made without difficulty. The race, the symptoms of anemia, with a history of rheumatic pains and abdominal crises, the scleral discoloration, the absence of splenomegaly, the presence or history of leg ulcer, all suggest the condition. Examination of the blood, particularly late examination of sealed fresh preparation, makes the diagnosis.

Prognosis.—In adults the prognosis is good. In children it should be guarded.

Sickle cell families have a high child mortality. The children are poorly developed and peculiarly susceptible to infections. There is myocardial injury, due doubtless to the anemia and there is renal disturbance with albuminuria and lowered function. It is certain that a considerable proportion of the underdevelopment seen in negro children past the rickets age is due to this disease.

Treatment.—This is symptomatic. Iron, arsenic and forced feeding may hasten and prolong a remission. Transfusions have been used with some success, but no lasting effect is secured. Surgical intervention may be necessary to aid healing of ulcers. In severe cases with ulcer it is probable that splenectomy would be of material benefit.

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DISCUSSION

Dr. John G. Huck, Baltimore, Md.—We have seen and studied about forty cases of sickle cell anemia in Baltimore, the most recent of which came to the Pediatric Dispensary with symptoms of severe epigastric pain. Physical examination revealed pallor of the mucous membrane, a general glandular enlargement, enlarged tonsils and systolic murmur at the mitral area. The spleen and liver were not palpable. There was no greenish yellow tint of the sclerae and no history of an ulcer. The temperature was 102°.

A blood smear was sent to us and there were the characteristic findings described by Dr. Sydenstricker: a fair number of poikilocytes and a few sickle shaped cells. The red count and hemoglobin were markedly reduced with a slight increase in the white count. Fresh preparations showed marked sickling after standing. The patient's mother was examined and no evidence of the disease could be found. The father is said to have died from influenza three years previously and undoubtedly transmitted the disease.

As Dr. Sydenstricker said, the disease is hereditary. I have followed two families through three generations and the disease was found in each generation. Apparently the sickle cell condition is inherited according to the Mendelian law for the inheritance of a single factor. That the disease is much more prevalent than is commonly supposed is shown by the fact that ten cases have been detected in one of our clinics in the past year.

Our experimental studies on the blood thus far bring out the following points:

(1) The cells show very little sickling when observed immediately in fresh preparation, but on standing they acquire bizarre forms.

(2) If the cells of these patients are placed in (a) plain physiological salt solution; (b) in isotonic sodium chlorid containing 1.25 per cent sodium citrate; (c) oxalated whole blood; and from each of these suspensions fresh preparations are made, the red cells on standing take on bizarre forms.

(3) Red blood cells from patients with the disease were washed in isotonic salt solution and placed in normal serum of the same blood group. The bizarre forms appeared as in the experiments described.

(4) If normal red cells of the same blood group as the patients are washed in isotonic salt solution and suspended in the patient's serum, the normal cells will remain unchanged.

(5) A drop of blood from cases of pernicious anemia, secondary anemia, myeloid and lymphoid leukemia, congenital hemolytic jaundice and Banti's disease were set up in fresh preparations, but no change was obtained in their cells after one week.

(6) The intravenous injection into rabbits of a 50 per cent suspension of washed red cells of a patient with severe symptoms provoked no visible abnormality in the blood of these animals.

Repeated blood cultures in all of our cases have been negative.

From these experiments I came to the conclusion that the sickling is an inherent property of the red cells, and that it most probably cannot be transmitted to animals.

I should like to call attention to a few points of variance between Dr. Sydenstricker's observations and our own.

Dr. Sydenstricker stated that "the disease is recognizable in two phases which he has termed active and latent, according to the condition of the blood and the multitude and severity of the symptoms."

Our attitude is to classify the cases into three groups instead of two. The first group is the symptomless form. In this group the patients have had no symptoms that can be obtained from them of the disease. Fresh preparations from their blood show that 25 per cent of the cells acquire bizarre forms after standing twenty-four hours or longer. The second group is the mild form. These patients throughout life have occasional symptoms, which do not affect them to any great extent. In fresh preparations from their blood 75 per cent of the red cells acquire bizarre forms after standing twenty-four hours

or longer. The third group is the severe form. These patients are practically never symptom free. Sometimes they have severe symptoms and at other times mild. In fresh preparations of their blood 99 per cent of the red cells acquire bizarre forms after standing twenty-four hours or longer.

The sclerae in the cases I have seen are at times discolored. Phagocytosis in our cases was not always present in the circulating blood. For example, daily examination for a period showed none, whereas on the following day many were observed. Neither were nucleated red cells present at all times.

I should like to ask Dr. Sydenstricker (1) whether he examined fresh preparations of bone marrow in any of these cases? The reason for this question is that I feel from our experiments that the phenomenon of sickling does not occur in the circulating blood and bone marrow, that it occurs only *in vitro*.

(2) Also I should like to know whether blood cultures showed any micro-organisms?

There is one more factor I would like to bring out before closing: that sickle cell anemia is surely hemolytic in character. This is evident from the finding of large amounts of urobilin in the blood and urine. What the toxin is and whence it comes I do not know. Perhaps the spleen plays a role. Phagocytosis would hardly account for the severe anemia, although it must be kept in mind.

Finally, sickle cell anemia has some things in common with congenital hemolytic jaundice; for example, the series of relapses and remissions, the severe anemia, the evidence of blood destruction, the blood picture except for the bizarre forms in the fresh preparations, and the leg ulcers. But in the latter there is splenomegaly and in the former, in uncomplicated cases, the spleen is atrophic. Splenectomy undoubtedly helps in congenital hemolytic jaundice and whether it will help sickle cell anemia is an open question.

Dr. W. A. Mulherin, Augusta, Ga.—This Section is especially fortunate in having Dr. Sydenstricker, of the University of Georgia, present to it a resume of the highly scientific work done by him on sickle cell anemia. The medical profession might well give him credit for his contribution to medicine by calling this disease Sydenstricker anemia. Sydenstricker has done more constructive work on this disease than any physician in America or elsewhere. It was he who took this medical curiosity out of the realm of uncertainty and established it as a definite clinical entity. He has been the only one who has completely autopsied a case of sickle cell anemia, or Sydenstricker anemia, and in consequence he has given us the only pathological knowledge about this disease that we possess.

It was Sydenstricker who verified Emmel's lead that the disease might be familial. Again, Mason's assumption that the disease might be confined to the negro race was confirmed by Sydenstricker's blood work on a series of 2000 patients, 1000 whites and 1000 negroes.

The Section is also fortunate in having Dr. Huck, of Hopkins, to lead in the discussion of this subject. Next to Sydenstricker he has done very valuable and confirmatory work. It was gratifying and pleasing to Sydenstricker, Mulherin and Houseal to have their findings and conclusions, as set forth in the August, 1923, number of the *American Medical Association Journal of Diseases of Children*, confirmed *in toto* by Huck in an article appearing in the October, 1923, number of the *Johns Hopkins Hospital Bulletin*.

Now, what is the practical side, from a medical standpoint, of sickle cell anemia? It is a much more common disease in negroes than is generally believed. Very little has been known about it, therefore it has not been looked for, and in consequence has not been found. It is of industrial, as well as medical, importance. Efficiency is lowered in the adult and total disability is the result of recurrent attacks. In families where it exists infant and child mortality runs very high. It does its meanest work in childhood, therefore it is chiefly a pediatric problem. In the adult it rarely kills.

Huck's classification of the clinical picture as symptomless, medium-severe, and severe, I do not like as well as latent type and active type. An almost constant objective symptom in all cases of Sydenstricker anemia is greenish-yellow sclerae. We have seen some sixty-odd cases at the University of Georgia, and in no single case were the greenish-yellow eyeballs absent. Therefore the term "symptomless" in its classification appears to me to be misleading.

You have all seen the latent type. An indifferent negro child, with greenish-yellow (not muddy-yellow) eyeballs is said by the mother to enjoy pretty fair health, but to be "somewhat trifling." If the mother is questioned closely she will frequently give a past history of the child's having had arthritic pains, or belly-ache. If the blood of the child is examined a moderate degree of anemia will show. The fresh specimen of blood will not show sickling, but if it is sealed and allowed to stand for a half to two hours many sickle shaped erythrocytes will be seen. This delayed sickling is called latent sickling. The active type Dr. Sydenstricker has presented to you as a clear-cut clinical picture, with a definite and characteristic blood picture. In the active type there are numerous sickle shaped erythrocytes in the fresh blood.

Treatment, aside from treating it like ordinary secondary anemia, appears to be very much on the order of treatment of tuberculosis. If this disease is kept in a latent stage by proper hygienic care, correct feeding, sunshine and plenty of sleep, no great harm will come to the child. If it is allowed to become active it lowers vital force, invites various infections and then becomes an important factor in contributing to a fatal outcome.

As we have a plentiful supply of negroes with us in the South, it is important that we acquaint ourselves with this disease. I am quite convinced there is more Syndenstricker anemia in the South

than is at present realized. It is therefore a Southern problem for us to work out.

Dr. Sydenstricker (closing).—We have been able to confirm Dr. Huck's experimental observations in all essential details. The fact that these patients have achylia is interesting. We all know the frequency with which achylia is associated with anemia. The gastric symptoms which we have associated with the splenic hemorrhages and infarcts which occur in this disease may be due to achylia in some cases. We feel, however, that the gastric crises with severe pain are due to infarcts in the spleen. We have classified the cases as latent and active because in our cases, without exception, we have been able to extract a history of characteristic symptoms. We have asked leading questions and by so doing have always secured a history of abdominal pain and rheumatic pain occurring with more than ordinary frequency in the latent cases. It is a very common disease, as Dr. Huck has recognized. It occurs in one-fourth of 1 per cent of the negroes we have examined. We have not run such a large series of white bloods as we have of bloods of colored patients, but in our present state of knowledge sickle cell anemia is confined to the negro race.

THE EFFECT OF IRRADIATION ON MALIGNANCY AND PATIENT*

By S. S. MARCHBANKS, M.D.,
and
T. C. CROWELL, M.D.,
Chattanooga, Tenn.

The effect of irradiation on patient and malignancy can only be thought of in relation to the endocrine type and physical condition of the patient; and the type, grade and period of duration of the malignancy. In patients of neurotic tendencies and endocrine imbalance we are more apt to find the more highly resistant type of malignancies that require heavier doses and greater care in diagnosis and extent of irradiation. In patients of the phlegmatic order we usually find a less resistant condition and a much quicker response to irradiation.

Dosages vary with the general physical condition of the patient and the type of malignancy. In carcinoma of the breast we have found that there has been no evidence of injury to the pleura or lungs and have had what appears to be cures, when irradiation without surgery was the procedure, in the limited number of cases that we have been fortunate enough to get for irradiation only. We have not used radium in breast cases and believe we get better results with 150 thousand volts and ¾ mm. copper plus 1 mm. aluminum filter than with higher voltages, considering that breasts are in the class between the superficial and deep malignancies. We have had no experience with bleeding in breast cases coming to operation after irradiation and hope this may be discussed. These cases are treated through anterior and lateral ports and both breasts should be included since the lymphatics interlace.

In malignancies of the uterus we have used radium and the higher voltage (200 thousand or more) with variation of our dosage depending upon the extent of the lesion and its type and grade. We have found that these cases when seen early and of Grades 1 and 2, clear up readily, while Grades 3 and 4, especially 4, have shown no permanent improvement. Of course, it remains to be seen what Grades 1 and 2 will do. These grades are much less apt to metastasize, but being more nearly like the normal adult cell, are harder to kill by the ray, while 3 and 4, being more embryonic, succumb readily, but may have already metastasized. To prevent roentgen ray sickness and over-stimulation of the so-called immunization process, we have divided the dosage into from three to six parts, administering it daily or every other day. We have had practically no trouble with roentgen ray sickness. All cases of malignancies are seen at stated intervals, weekly or bi-weekly, for observation and blood counts when, if progress is not satisfactory, a second series of irradiations is instituted. Usually this comes in from about four to six weeks. We have had no evidence of symptoms indicating injury to the intestine.

In malignancies of long bones we have found that heavy irradiation with 200 kilovolts and 1 mm. copper and 1 mm. aluminum filtration, followed by short doses at weekly and bi-weekly intervals, has been productive of the best results.

*Read in Section on Radiology, Southern Medical Association, Seventeenth Annual Meeting, Washington, D. C., Nov. 12-15, 1923.

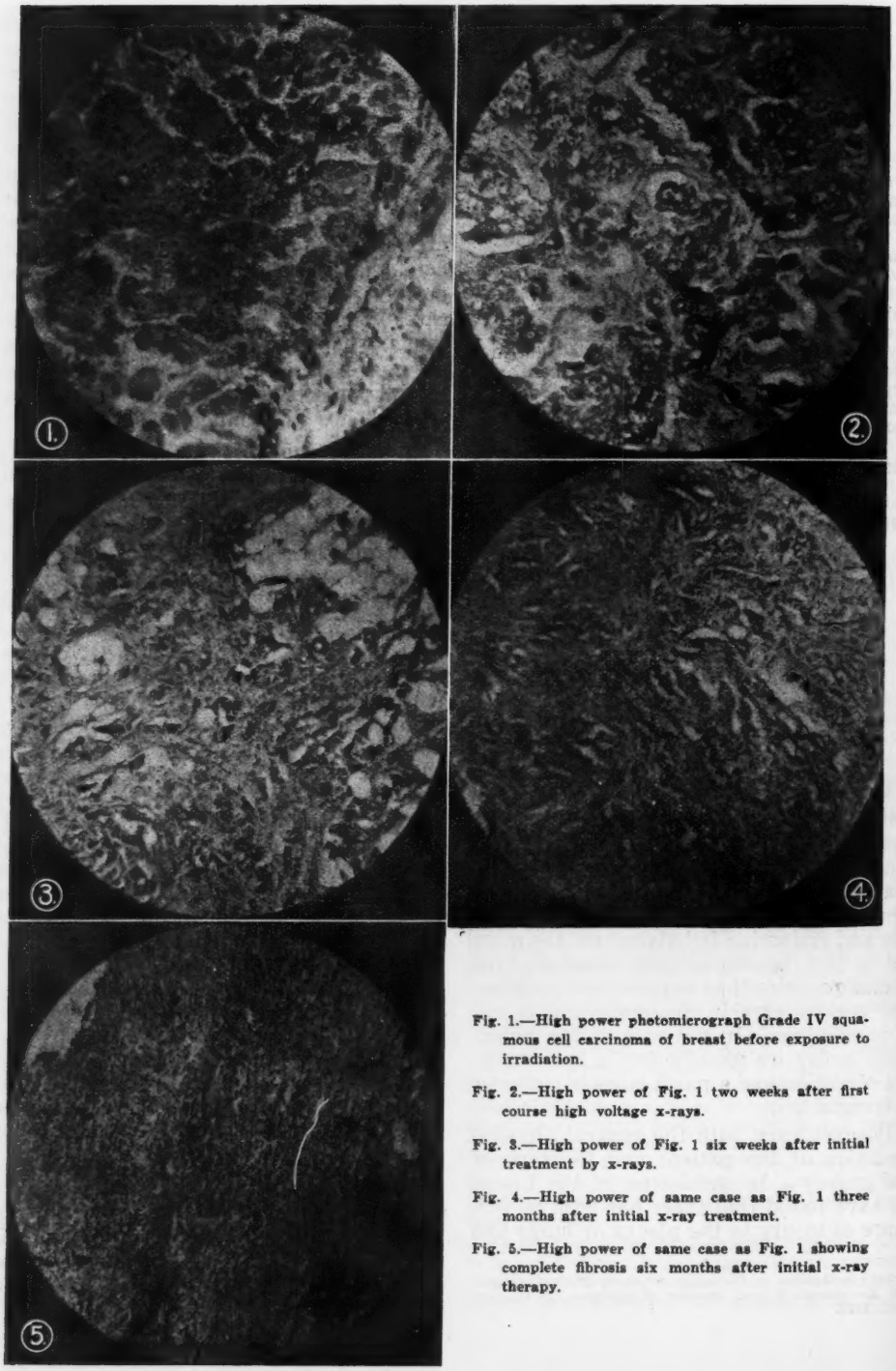

Fig. 1.—High power photomicrograph Grade IV squamous cell carcinoma of breast before exposure to irradiation.

Fig. 2.—High power of Fig. 1 two weeks after first course high voltage x-rays.

Fig. 3.—High power of Fig. 1 six weeks after initial treatment by x-rays.

Fig. 4.—High power of same case as Fig. 1 three months after initial x-ray treatment.

Fig. 5.—High power of same case as Fig. 1 showing complete fibrosis six months after initial x-ray therapy.

We have had two interesting cases of carcinoma of the colon: one of the cecum found as a result of an operation for appendicitis, proven pathologically, which was referred immediately for irradiation and has cleared up and remained so for nearly a year now; the other of the hepatic flexure area has not done well even after three series of deep therapy, although she is still living and able to get about fairly well.

To mention other malignancies would take too much time. In the beginning it was stated that variation must be made as conditions are found. Our high voltage technic is based upon the intensity determinations of Dessaur and we use a machine that is fully capable of delivering 200 kilovolts and more and as many milliamperes as the present day tubes will stand. Our usual formula is 200 kilovolts, 50 cm. focal skin distance, 1 mm. copper, 1 mm. aluminum filter and ports of entry large enough thoroughly to cover the area of involvement. With the above constants 540 milliamperes will deliver an erythema dose, or using Dessaur's determinations will deliver 120 units at the skin. With a properly calibrated sphere-gap any machine that will deliver the voltage and milliamperage as stated should duplicate this formula or erythema dose.

In uterine cases an average of 2400 mg. hours of radium is usually used in conjunction with deep x-ray therapy.

The pathological aspects of the effects of radiation on the malignancy, according to my associate, Dr. T. C. Crowell, are as follows:

"A discussion of the mode of reaction of cancer cells to irradiation resolves itself into two chief considerations which are for the most part theoretical: (1) some maintain that cellular autolysis is brought about by the direct action of the irritating rays upon the cell itself, and (2) others favor the belief that the cells are destroyed indirectly by the action of the rays upon the supersensitive blood capillaries obliterating these, and thus inhibiting growth by depriving the cells of

Fig. 1.—Sarcoma of humerus before beginning deep therapy on July 18, 1923. Evidently round cell variety.
Fig. 2.—Same as Fig. 1 on September 17, 1923, after the application of deep therapy.
Fig. 3.—Same as Figs. 1 and 2 on February 12, 1924, seven months after Fig. 1.

nutriment. There is a small third group who believe that irradiation produces its destructive action by some unknown cell chemical change, but since this deduction is purely theoretical we must pass it up for the present.

"We favor in part the first, and to a lesser extent the second consideration. We believe that the direct action of the ray upon the cancer cells is responsible for results in treatment. Irrespective of the manner of action, the series of changes in the cells is about as follows: in the earliest stage, a few days after treatment, there is a marked diminution in the intensity of staining with the usual tissue stains. Cancer cells ordinarily stain more deeply than normal cells because of the greater amount of chromatin material they contain. As the cells become paler, that is, as the chromatin is lost, the entire tissue structure becomes homogeneous, and soon there follows a breaking down of the cells into granular, fatty or hydropic degenerative products, or in some instances all three concurrently. Very soon fibroblasts begin to appear and new blood vessels begin to form. The fibrous tissue separates the fragmented cells into groups or cords, and these later either become entirely autolysed or else are encapsulated by the scar tissue depending upon the grade and cell type. If the cancer happened to be a Grade 1 of Broders, these encapsulated cells may at some later date become regenerative and grow, but if they belong to the Grade 4 of Broders, they are all destroyed early, provided they come within the range of the rays. Of course, it is understood by those doing cancer work that Grade 1 is less malignant but more resistant to the ray, while the other grades up to Grade 4 are more embryonal and, therefore, less resistant although more actively growing.

"Swelling and pain, which so often follow soon after radiation, are due to the irritant action of the rays upon the small vessels, causing an exudation of leucocytes and serum through the walls of these, and if the radiation has been intense, there may be a breaking of the capillaries and consequent hemorrhage into the tissues, both of which actions cause pain. This reaction usually subsides within a few days.

"Following radiation there is a consistent reduction of the carbon dioxid blood plasma and a delaying of the coagulation time. The total leucocyte count is markedly lowered with reduction of the lymphocytes at the expense of the polymorphonuclears. There is usually an increase in the total non-protein nitrogen in urine and blood and an increase in blood cholesterol in advanced cases. There are no noteworthy changes in the erythrocytes except after a long series of radiations."

In regard to sectioning lesions for diagnosis and the determining of pathological changes, there seems to be some controversy as to the advisability of this procedure on account of the danger of metastasis. However, the properly trained pathologist is able to differentiate his types even after the first or second series of radiations. In consequence, we feel that it is satisfactory to take the section after radiation if the referring surgeon or physician objects to a preliminary section.

DISCUSSION

Dr. A. L. Gray, Richmond, Va.—Dr. Broders has shown very positively that basal cell carcinoma may become prickle cell carcinoma and that is often the explanation of the late metastases in these cases.

I agree with what Dr. Walters has said concerning one of our commonly noted effects which we refer to as erythema. The erythema does not mean anything at all. If we could adopt some such term as skin unit, as Dessauer recommended, and interpret our dosage in terms of skin units I believe it would be very much better. I find that exactly the same physical factors in dosage will produce entirely different results in different individuals and all we can do in estimating our erythema dose, so-called, is to give a dose using such physical factors as will in the average individual produce erythema.

I thought for many years that the cancer cell was destroyed by the x-ray because of some special sensitiveness that this cancer cell possessed which made it less resistant to the x-ray than the normal tissue cell. That was held by all of us. When we began to discuss the electron and ionization based upon the electron theory I thought that the effect upon the cancer cell was due to the redistribution of electrons in the cell which was more sensitive under x-ray stimulation than the normal tissue cell; that this redistribution took from that cell its carcinoma characteristics or rather took from it its ability to proliferate and grow and the cell consequently died. I do not know which is right, but I am compelled to accept the theory of such men as Ewing, J. B. Murphy and Opitz and their associates who, by experimentation in rat cancer, have proven to their satisfaction that the cancer cell itself is never killed directly by the x-ray. I am unwilling, then, to continue to hold to the direct destructive action of the x-ray upon cancer cells. I am also unwilling to hold to the theory that the cells are deprived of nutrition by cutting off their blood supply. These same gentlemen have proven that there is not that active shrinkage of capillaries and arterioles that we thought existed. I am, therefore, brought back to their conclusions that the effect of the roentgen ray in destroying malignancy is an indirect one, not upon the cancer cell itself, not upon the blood vessel wall, but upon the tissue cells or lymphocytes, which are stimulated to pour out immunizing bodies, antibodies, if you please, which destroy these malignant cells.

Reference has been made to the prevention of x-ray sickness. It seems to me that we are not very far from determining just what x-ray sick-

ness is due to. The theory of inhalation of gases has not held water. The theory of direct stimulation of the stomach has not held water. We obtain in our laboratory as severe x-ray sickness from the treatment of the breast as we do from treatment of the abdomen. That, I confess, is not in accordance with the experience of a great many. Some of the most troublesome cases that I have had have been following post-operative breast treatments. I believe that we are going to prove sooner or later that a similar material to that referred to by Dr. Landham — a material liberated in a similar way to the leucolytic substance or whatever it may be, whether it be a protein or other matter that has been shown to destroy white cells in a healthy animal after the administration of x-rays to another animal and the injection of its blood into the healthy animal. We are liberating material in the blood stream, perhaps organic, perhaps inorganic, but most probably protein, and these are producing our x-ray sickness. I believe it is going to continue unless, as Dr. Marchbanks is doing, we reduce the amount of our dosage, giving it in fractional portions over a long time so that the patient may react between the treatment. In that way we may prevent the recurrence of x-ray sickness.

Dr. J. M. Martin, Dallas, Tex.—We have had some trouble at the Baylor Hospital with roentgen sickness after deep therapy. The sickness could hardly be attributed to gases from the tube since they do not reach the patient. On the recommendation of Dr. Hambleton, of the Department of Pharmacology of the Baylor Medical School, Dr. Charles Martin has been using heavy doses of bromids and chloral per rectum in these cases with rather gratifying results. These drugs appear to depress the vomiting centers.

Dr. W. P. Whittington, Asheville, N. C.—I have a patient who I suppose has over one hundred of what they called at the Kelly Radium Hospital blue wart cancers. I have never had a microscopic examination made. A great number were on the face and head. His left eyeball was taken out following an injury from a piece of steel and one of these growths attacked the cicatrix where the eye was enucleated. I found when I treated this man with the open tube stand that he became fearfully sick and vomited for a day or two, notwithstanding the alkaline treatment. The moment he comes into the office, if I have been treating other cases, his nausea begins even without treatment. I inserted the deep therapy apparatus a short time ago with the tube enclosed in a large couch with no opening into the room where the patient lies, and since then he has not been sick at all. I do not believe it is altogether the odor, but where we can keep away the gas or ozone odor the patients do not suffer so much. In my patients who have had trouble about the face or head where I have had to use a number of treatments the nausea was extreme.

Dr. Marchbanks (closing).—I agree with Dr. Gray that it does not make much difference what the erythema dose is. It is the effect we are after. However, the question of immunity is ever present, but I do believe that the direct action has to be accounted for depending on the amount of involvement, because if we do not destroy the localized area of involvement the immunization may not be sufficient. I have seen comparatively small doses clear up malignancy.

It may be that one reason I have not had so much roentgen sickness is that my table is about four feet from an open window with a very good circulation of fresh air.

TWINS WITH HYPERTROPHIC PYLORIC STENOSIS*

By H. LESLIE MOORE, A.B., M.D.,
Dallas, Tex.

I have been unable to find in the medical literature any case reported of pyloric stenosis occurring in twins. It would be interesting to know if this condition has ever occurred in only one of twins.

The twins to be discussed both were males, who had had a normal birth. They were the first children and weighed at birth 6¼ and 6 pounds, respectively. The family history was negative, except that the mother had a slight goitre and at delivery had a temperature which lasted three or four days. Examination of the blood showed plasmodium. On the third day, both babies developed fever reaching 103 and 103.5°, which lasted four days, running from 101 to 101.5°. Their bloods were not examined. The mother was given quinin by mouth and the babies were given it by inunction. They were given the breast and condensed milk up to two weeks of age. At this time both began vomiting and the attending physician stopped the breast and condensed milk and put them on evaporated milk. Vomiting continued and in a day or two they were changed to diluted cow's milk. During all this time the vomiting was of an explosive type and increased in severity.

At the end of the fourth week they came under my care. The weight at this time was 4 pounds 15 ounces and 4 pounds 14 ounces. Both were badly emaciated and their general vitality was at a very low ebb. Both gave a typical starvation cry. They vomited with force after practically every feeding, giving distinct evidence of pain preceding the vomiting, and they were badly constipated. Upon physical examination the fontanels were found sunken, the facies were pinched and there was a marked degree of emaciation.

In the epigastrium there was visible peristalsis, giving a typical pyloric wave and a palpable tumor over the pyloric region. In fact, all of the cardinal symptoms of pyloric stenosis were present. Immediate operation was decided upon and

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*Read in Case Report Session, Section on Pediatrics, Southern Medical Association, Seventeenth Annual Meeting, Washington, D. C., Nov. 12-15, 1923.

was done by a skilled surgeon, thoroughly familiar with this class of cases.

On opening the abdomen, a full-size tumor was found in both cases and the Rammstedt operation was done quickly. Both stood the operation surprisingly well with but little shock. Written orders were given for two drams of a feeding formula to be given every two hours, and midway between each feeding two drams of sterile water. On my return five hours later I found that each had vomited every time food or water was given. Searching for the cause, I found that the nurse had misread the orders and was giving two ounces instead of two drams. With this correction the vomiting promptly ceased. Both being in an unfavorable condition to start with, we were much surprised to find that neither the operation nor the unfortunate mistake of the nurse seemed to have any ill effect. Things went smoothly for forty-eight hours, the feeding being gradually increased in quantity. Both babies took it with avidity and the stools began to appear normal. At this time, which was forty-eight hours following the operation, the second twin developed clonic convulsions involving only the left side. These gradually decreased in severity and at the end of forty-eight hours entirely ceased. Both were then taking their food well and gaining a little in weight. The second twin slept all the time, but took its food heartily. The abdomen was considerably distended with gas which could be partially relieved with enemas. Because of this, the abdominal band was released. On the sixth day the incision separated and a fold of intestine protruded. This was due to the low vitality of the tissues and the releasing of the abdominal binder. Under light anesthesia the wound was again closed with apparently no ill effects. The temperature was normal, pulse 120 with good volume, and there was no vomiting. Six hours following this clonic convulsions affecting the left side again started and continued until the end came four hours later. Death resulted from respiratory paralysis. Artificial respiration kept the heart beating for thirty minutes longer.

The first twin did well up to this time, except that he had a great deal of discomfort. He was hungry and gaining in weight, his abdomen was soft and not distended, and his general condition was very satisfactory. The next morning, which was the seventh day following the operation, everything was completely reversed and it looked as though the baby could not live through the morning. The weight had dropped several ounces overnight and he looked completely washed out, yet he had neither vomited nor had any loose stools. Fifty c. c. of citrated blood was immediately given through the longitudinal sinus and again the picture was completely reversed and its general condition became as good as it had been at any time since the operation. The appetite, which was completely lost during the morning, returned and every bottle was taken with much eagerness. The next morning I found everything going well and the baby in first-class general condition. Three hours later, which was twenty-four hours following the transfusion and the eighth day following the operation, I was notified by the nurse that the baby was showing signs of respiratory failure. When I arrived breathing had practically ceased. Artificial respiration was being given and the pulse continued with good quality one hour after respiratory failure. Both twins thus died from the same disturbance. No autopsy could be obtained.

714 Medical Arts Bldg.

TROPICAL DISEASES AND PUBLIC HEALTH

CHILD HYGIENE AND THE SHEPPARD-TOWNER FUND*

By ETHEL M. WATTERS, M.D.,
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The appalling and apparently unnecessary loss of the lives of mothers and babies in childbirth concerned humanitarians for years before the national significance of this waste of life was realized. Studies in maternal and infant mortality revealed definite, preventable causes; and in 1919 minimum standards for the public protection of the health of mothers and children were formulated, which even now are nowhere adequately approached. The national need was recognized by the passage of the Maternity and Infancy Act, which became a law November 23, 1921. It has been in operation only about 18 months.

It may be expedient on this occasion to begin with an explanation of the Maternity and Infancy Act, which is popularly known as the Sheppard-Towner law, in order that those physicians who are not primarily occupied with public health affairs may have an understanding of this recent development in child hygiene.

The provisions of the Act may be cited briefly:

(1) For five years an annual appropriation of $1,240,000 is authorized by Congress. Of this appropriation a sum not to exceed $50,000 may be used by the Children's Bureau in administering the Act and in further investigating infant and maternal mortality, and the balance is to be divided among the states accepting the Act as follows: $5000, granted outright to each state; another $5000 to each state if matched by state funds; and the remainder allotted to the states on the basis of population, if matched.

(2) The administration of the Act nationally is lodged with the Children's Bureau in the Department of Labor and in the states with the bureaus of child hygiene or child welfare of the state departments of health. If such a bureau is nonexistent, then another state agency may be designated.

(3) Plans of work are originated and carried out by each state, but are first submitted to the Federal Board of Maternity and Infant Hygiene for approval, which must be granted if the plans are "reasonably appropriate and adequate."

At present there are 41 states which are conducting work under the Maternity and Infancy Act. Of these, 40 have accepted by legislature, but the Connecticut Legislature failed to ratify the Governor's acceptance, so that after December, 1923, Connecticut will not be able to avail itself further of the provisions of the Act. The other seven states which refused to accept are Maine, Vermont, Massachusetts, Rhode Island, Louisiana, Illinois and Kansas.

Fourteen states, which were unable to match the Federal money from the 1922 funds, and six states, which were unable to match the Federal money from the 1923 funds, carried on their projects in the promotion of maternal and infant welfare with the unmatched $5000 only. However, during this present fiscal year of 1924 all of the 40 states have matched their allotment in full or in part. At present New York is using the largest Federal appropriation from the 1924 funds, $80,041.78; and North Dakota the smallest, $6000. The great difference in the amount of money being expended in this program gives but one indication of the contrast offered by the various states. The success of the work depends upon many correlating factors, such as the public interest aroused, the aid of the women's organizations, political changes which sometimes necessitate a wholly new personnel, the interest and support of the local medical profession, and finally the lack of avail-

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able trained workers for public health positions.

STATE ACTIVITIES

The local administration of the Act is vested in the state departments of health except in two states, in one of which it is vested in the department of education and in the other in the university extension division. Twenty-six of the directors of child hygiene divisions are physicians, 8 are public health nurses. The group of lay directors consists of five women and one man.

The work of the state child hygiene divisions is purely educational and not remedial. It depends not only upon the size of the budget, but also upon the accomplishments in this field prior to the passage of the Maternity and Infancy Act. The measures adopted include: (1) those for the welfare of the mother, and (2) those for the health of infants and children of pre-school age.

Before the programs made possible by the Sheppard-Towner funds comparatively little was accomplished throughout the various states in the field of maternal welfare. Rural mothers, particularly, were entirely neglected. Maternity centers formed a part of a few urban programs and some private organizations' work, but nothing had been done on a state-wide basis. At present maternity centers, to which mothers can come for examination and advice, form an integral part of the work. They may be permanently established centers with consultations at short regular intervals or they may be conducted by an itinerant staff which visits monthly, quarterly, or semi-annually certain small towns and villages, to which women come from the surrounding rural territory for advice.

For instance, where there is a permanent general health center a stated time is set aside for the conferences with mothers. At this time they are examined and instructed as to how and what to prepare for a birth in the home, with reference both to what they should provide for themselves and for the infant, and the care they should receive during the prenatal and lying-in periods. If the examination reveals any pathological condition the mother is referred to a physician. Mississippi reported that during the six-month period from January 1 to June 30, 1923, 2263 conferences were held with mothers about prenatal and maternity care. This number does not include home visits made by the nurses.

In North Dakota four counties were selected for intensive work, and visits by the state staff at regular six-week intervals are scheduled—the remainder of the State being visited annually. As there are few doctors there, and some cover areas with a radius of 30 to 50 miles, in a climate where during five or six months of the year a team must be driven, these conferences are proving a great boon to the rural women, and the Director reports "There is a great demand for examination on the part of women who are suffering from lack of care at previous childbirths." Too often it happens that a mother with several children comes to a conference for advice with the history of a premature labor, remote from medical care.

Physicians with special obstetrical training are members of the staffs of four state bureaus and local obstetricians or consulting obstetricians in other states aid the Bureau at the mothers' conferences, as these meetings are called. Physical examination, including urinalysis, blood pressure, and sometimes Wassermann tests, are made, and advice given as to the means and methods of improving the prospective mother's health. Great emphasis is placed upon the value of regular visits to the physician who is to deliver the patient. It is a general rule that when a patient presents herself at these consultations for advice, if she has not engaged a physician or is to be attended by a midwife she is admitted at once, but if she has engaged her physician she must bring his consent before examination at the conference is made.

The public health nurses in the different states are charged with definite responsibility in aiding rural mothers to seek their doctors early, to prepare for their confinements either at home or in the hospital, to secure specimens, and in some states to report the general condition, and the blood pressure of certain rural patients to their doctors, and finally

to help the physicians persuade the patients to do that which seems best for the welfare of themselves and their babies.

The midwife problem in this country is receiving some attention, 13 states having conducted surveys to determine the number and status of the midwives within their borders. Of the 26,627 registered midwives in the United States, 20,066 are in 9 of the Southern states, and in these 9 states there are also conservatively estimated to be 10,062 more midwives, most of them illiterate negro women, untrained save by observation, who frequently serve the white race as well as their own. While these figures indicate the problem as being largest in the South, it may be well to point out that these states recognize the fact that they have a problem, whereas a number of the other states do not. They fail to license, examine, or register their midwives. In one Eastern state the word midwife has been stricken from the law requiring the reporting of births, though a survey of a small section of the State revealed 117 midwives practicing. The midwife problem, however, is being attacked effectively by most of the Southern states. The midwives are being required to register and to attend classes where they are taught the state laws pertaining to their practice, and where demonstrations are made of all phases of their patients' care, which the midwives must repeat to the satisfaction of the instructor. The midwives are required to use special bags, often made of unbleached muslin, containing the supplies they are permitted by law to carry. They are also taught to give postpartum care, not to leave the newly delivered mother to shift for herself and her baby.

These midwife classes, which are taught by physicians, by public health nurses, and in one state by a registered midwife, vary from one or two meetings to a series of meetings held regularly for several months. Four of the Southern states have negro graduate nurses who are accomplishing much in this teaching, as many physicians can testify who have been called to attend abnormal cases.

In addition to the classes the states have prepared simple booklets or leaflets setting forth the regulations governing the midwives. There are 21 states making some provision for the instruction of midwives. In some of the states this work has secured the hearty cooperation of the physicians, many of whom are using the midwives for post-partum nursing care. In other states the physicians have not become aware of the magnitude of the problem and are uninterested or antagonistic. However, three states have reported a marked decrease in the number of registered midwives following the introduction of careful instruction and supervision, and further significant results may be expected in a reduction of infant and maternal mortality and morbidity.

The available statistics indicate that Chile and Belgium are the only two countries which lose more mothers per live births than the United States. Why our maternal mortality should be so great is a question not only for statisticians and public health workers, but also for medical schools and individual physicians. The object of the state program is to present to mothers their responsibility in seeking the best care they can afford, not only for their children's sake, but also to insure their own physical fitness. Furthermore, these programs serve to bring to the citizens of the community a realizing sense of existing conditions and to stimulate them to provide adequate facilities for the care of mothers. An evidence of such quickened community sense is the fact that in the five hospitals now being built in the smaller towns of New Hampshire excellent maternity departments are being included.

For several years there has been increasing interest in the health of the infant and pre-school child, and baby health stations have been established in the cities. The Sheppard-Towner work has merely expanded this program, extending it to the rural districts. The physicians of the state bureaus or the consulting pediatricians are holding children's conferences more or less regularly in the smaller towns or rural school houses. At these conferences the pre-school children and babies are examined and the mother is instructed about suitable diet, clothing, and all the details of personal hygiene,

and is given advice concerning the defects found. Some of these conferences are further elaborated by having in attendance a dietitian who can talk about foods, family budgets, etc., and a dental hygienist who cleans the teeth of the youngsters and tells the mother about the importance of the preservation of the six-year molars. Reports of the thousands of children examined contain notation of the common defects of childhood, which, if remedied, will conserve the health and development of the child.

At practically all of these conferences it has been found necessary to stress the value of breast feeding in order to counteract the tendency to wean the babies at birth. Reports indicate that this tendency arises largely from the physician's or the mother's interest in some particular artificial food. However, other reports from different states tell the opposite story: that mothers are continuing to breast feed their infants until they are two years old, or older, to the obvious detriment of their teeth, bones and general nutrition. With the data that is being gathered from these mothers some excellent comparative studies of the diets of our pre-school children in different sections of the country can be made later. Preliminary examination of the reports seems to indicate that children of this age receive too much carbohydrate food and their diets as a whole contain too little calcium, phosphorus and vitamin-containing food.

In four states special motor cars have been made, which are completely fitted as offices. These cars are moved from place to place, and the examining physicians are enabled to have most of the conveniences, but when the members of the bureaus depend upon local committees they use whatever space has been provided in churches, stores, school houses, or farm houses, and even converted saloons serve the purpose of a temporary examining room.

In most of the states the physicians who carry on this work are members of the staff of the state bureau of child hygiene as part-time or full-time employes, or they are local physicians who volunteer their services. Several of the Southern states have established a county unit plan, according to which all work originates in the county, and the infancy and maternity work is done by individuals attached to the county health departments. It is hoped that local responsibility will be fostered by this method.

Other educational measures employed are classes for mothers and for older girls, which nurses are forming in local communities to teach and demonstrate infant care. Nutrition classes for undernourished pre-school children are also being tried, but they are more difficult and less productive of spectacular results than are those for older children. Recently, too, an interest has been aroused in habit clinics, which are being established to help mothers overcome certain bad habits acquired by their little children. The first of these clinics was established over a year ago by Dr. Douglas A. Thom, in Boston, in cooperation with the Federal Children's Bureau.

Only 24 of the 41 states cooperating are in the Birth Registration Area of the Bureau of the Census, and only 31 are in the Death Registration Area, so that state plans contain mention of various methods of stimulating the registration of births and deaths in order that the human bookkeeping may be sufficiently accurate to give some indication later on as to the worth of the efforts expended in improving maternal and infant welfare.

NATIONAL ACTIVITIES

The Federal administration of the Act has included approval of the state plans and activities, verifying budgets and checking accounts, in addition to general service to state administrative agencies, including visits to all the states for conference and cooperation.

Public health nurses' institutes or meetings have been held in 29 states for the purpose of securing the interest of all public health nurses, including those who are engaged primarily in the other specialties and those engaged in general public health nursing. The infancy and maternity programs were explained and the modern technic of prenatal, obstetrical and post-

natal care was discussed with these nurses in an effort to enlist their cooperation to the fullest possible extent.

News letters for the state directors, a leaflet on the "Public Health Nurse in Relation to the Maternity and Infancy Act," and a folder, "Minimum Standards of Prenatal Care," have been prepared and distributed in large quantities.

In response to the demand for popular visual-educational material the Bureau has just finished and now has ready for distribution a two-reel film entitled "Well-Born," which very effectively illustrates the modern standards of prenatal care. The experience of two young couples, one living in the city, the other in the country, vividly portray not only the essential personal hygiene of the mother but the help to be derived from the private physician as well as from available community resources such as prenatal conferences and the county nurse.

Several studies have been begun: for example, an investigation of maternity homes in Pennsylvania and in Minnesota is almost completed. This study is intended to bring out the medical and sociological factors of maternal and infant welfare in these institutions. In one state the social standards maintained by these homes is far in advance of the medical care provided for the patient during her pregnancy and her puerperium, and for her baby.

More than 18,000 mothers die in childbirth each year in the United States. What are we going to do about it? In the last analysis this is a question to be answered by the medical profession. The majority of these mothers might be saved. Their deaths are due, for the most part, to puerperal septicemia or to albuminuria with convulsions. Some of these women died in places where the best of care was available. They died because they were ignorant of their need of medical supervision throughout their pregnancy. To what extent is the medical profession to blame for their ignorance?

In the South you are shouldering your responsibility. You are enlightening mothers and fathers. You have a tremendous handicap because of the weight of tradition which makes the mothers reluctant to listen to your words, and you have to bear the burden of superstition to which they give ready ear. These factors register in the maternal death returns. In one state the maternal death rate among the colored population mounted to 14.8 in 1921 as against 6.8, the maternal death rate for the country as a whole.

Where systematic preventive measures have been taken the rates have decreased. We have knowledge of the methods which have brought encouraging results. The future will tell us what use we make of this knowledge and gratifying as these tangible results will be in the number of lives saved, we shall also see numbers of mothers and babies who come through sound as well as safe.

DISCUSSION

Dr. Mary E. Brydon, Director Child Welfare, State Board of Health, Richmond, Va.—The maternity and infancy welfare program which was reorganized in cooperation with the Children's Bureau following the acceptance by our Legislature of the Sheppard-Towner Act is very satisfactorily under way in Virginia. It is too early to expect big outstanding results, but I can bring to you today one very definite thing that we expect to accomplish in the five years that have been allowed by the Federal Government for demonstration work: this is, to establish in the minds of all agencies concerned the status of the family physician in every child hygiene program.

The theory that lies at the foundation of all child health measures includes certain fundamental principles: (1) It is the parents who should assume the whole responsibility of the health of their children. (2) The family physician is the only trained authority on this subject accessible to them, and he should have constant supervision over the health of the whole family, but particularly over pregnant mothers, infants and pre-school children. (3) No parent should allow a child to enter school any year of his school life until his physical fitness to receive his education has been ascertained by his family physician.

It is therefore necessary that both the family physician and the parents understand the relationship in which they stand to each other and that the terms of this relationship be not a matter of dollars and cents, important as that is from an economic standpoint, but a matter of the health of little children, the health and efficiency of the future citizens of Virginia.

Clinics and other correctional health measures put on by the county public health nurses and other interested persons serve as temporary measures until the people, the public, the school au-

thorities, the physicians, and the parents awaken to the real policy that underlies our efforts.

To bring this fact to the attention of both the family physician and the parents, the maternity and infancy program has been very carefully worked out. All work which would deal adequately with the health of children must start with the child in prenatal life. To this end activities have been directed toward reducing the infant and maternal death rate and toward the establishment of health ideals among parents and guardians of children.

The carrying out of the maternity and infancy welfare program is primarily dependent upon the public health nurses. The funds accruing from the joint state and Sheppard-Towner appropriation will enable us to establish at least one nursing service in each of fifty counties. We appropriate $500 to each county raising the balance of the money necessary to establish a service. At present we have forty of these public health nurses in thirty-four counties, each one of whom is required to give one-fourth of her time to infant and maternity welfare.

In Virginia, 33.4 per cent of the 70,000 births are delivered by midwives. Fully two-thirds of the more than 5500 midwives in the states are colored and are in the main ignorant, dirty and superstitious. To eliminate the worst, to train and supervise the best, and gradually raise the standard a nurse-supervisor of midwife education has been employed, and during the one year that the work has been conducted, forty-six classes have been held in twenty-seven counties with an attendance of 630 midwives. Since most of them are illiterate, the training they can receive must necessarily be simple. They are taught first of all the six things the State requires a midwife to pledge herself to do before she can charge for her services:

(1) Secure a Midwife Permit from the local registrar and sign the Pledge Card.

(2) Obey the Safety Rules on the back of the Permit.

(3) To make no internal examinations.

(4) To call a doctor when the patient has been in labor twenty-four hours.

(5) Register every birth within ten days.

(6) Put two drops of 1 per cent nitrate of silver solution in the eyes immediately after birth.

They are also taught the fundamentals of cleanliness and whatever obstetrical information they can assimilate.

We realize the need for intensive prenatal work: therefore a correspondence course for mothers has been started for training mothers to care for themselves before and after childbirth, and thus give the child a fair start in life. A general outline of this course has been sent to the physicians of the State, with a copy of the first lesson and a statement apprising them of the purposes of the course. Those doctors who looked over this material I am sure will agree that such a course will go far toward minimizing the midwife evil; that it will give them a more intelligent group of mothers to care for, and should eventually lower the maternal and infant death rate. Over one hundred mothers have already enrolled in this course during the one month it has been in operation.

Fortunately for us in Virginia, even before this Bureau received Federal aid for promoting maternity and infancy welfare, under the operation of our West law we had been investigating the condition of our children of school age and the result of our endeavors made it evident that there was a crying need all over the State for bringing to the attention of the parents their own responsibility in the prevention of disease, the correction of defects and the training of infants and pre school children in proper health habits. Therefore, to demonstrate this point child welfare conferences have been conducted in many communities. During the past year 1877 children under six were given medical examinations. Parents were asked to bring well babies to the conference and no child was examined except in the presence of the mother or guardian. Every mother had to give the name of her family doctor; and the individual records of the examination were sent as far as possible to these physicians. The records were explained to the parents and they were advised to visit their family physicians for reexamination at regular intervals. Thus their doctors may be able to correct defects and to give advice in regard to keeping the children in a physically fit condition.

It is to the family physician that the Bureau of Child Welfare turns for sympathetic cooperation in the reduction of the maternal and infant death rate, in preventing sickness among infants and pre school children and in maintaining the child's health. Every family with children should be under the supervision of an all-around practicing physician. It is to this family physician that the mother is being directed for advice in regard to herself and her children before they become sick.

We feel optimistic about our infant and maternal work, but we realize that this, like child welfare work generally, is a big problem and one with a diversity of interests. Our plan is still in process of evolution. There are difficulties to be overcome, but we believe they can be overcome, and we look forward to the realization of our ultimate aim: the day when every mother assumes her proper responsibility for the health of her family under the guidance of her family physician and every child, white and colored, city and country, in the State of Virginia is kept in a physically fit condition.

Dr. F. J. Underwood, Jackson, Miss.—The greatest mother in Mississippi is the State Board of Health engaged in the conservation of child life, the work being made possible in a larger way by the provisions of the Sheppard-Towner Bill. A great many people in this country are greatly concerned over the falling off in the birth rate, but our chief concern is our almost utter failure to conserve the health and the lives of the children that are born. I would like to recount

briefly a few milestones along the weary way in the conservation of child health which only very recently in this country has received any attention at all. The first step of importance was the publication in 1906 of the mortality statistics from 1900 to 1904, inclusive. In 1908, a Bureau of Child Hygiene was established in the Department of Public Health of New York City. In 1909, a conference on Child Hygiene was called by the American Academy of Physicians at New Haven, Conn., and following this the American Association for the Study and Prevention of Infant Mortality was organized. The next step, and a very notable one, was the organization in 1912 of the Federal Children's Bureau, the first time the Federal Government had expressed a definite interest in child health. Soon after that the New York State Department of Health established a bureau of Child Hygiene by enactment of law. In 1915 came the creation of the birth registration area by the United States Census Bureau. Since then some volunteer activities have been organized and are doing a very good work.

The greatest step forward was made two years ago by the passage of the Sheppard-Towner Maternity and Infancy Act.

There is no phase of public health work justly receiving more attention at the present time than maternal and infant hygiene. The mortality statistics, both maternal and infant, show that there is the greatest need for this work. Dr. Brydron brought out a great many valuable points and a good deal of what she said with reference to her state has been done in Mississippi. I have not time to go into detail, but I do wish to mention the midwife problem. In a survey made eighteen months ago we found that we had forty-two hundred midwives. We have about sixteen hundred practicing physicians. The number of midwives has now been reduced to fewer than three thousand. We have been doing our best to supervise and train those who are capable of being trained and to reduce the number: in other words, to cull out those who are incapable of being trained. I have here a photograph of a class in Marshall County showing the nurse and the county health officer engaged in that work. In Mississippi, we now fully realize the necessity for the training of midwives. By law, no undertaker can embalm a body without an embalmer's license. He must pass the embalmer's board and secure one. We have too long permitted ignorant, untrained midwives to attend women at the time in their lives when they are most susceptible to infection, that is, at the time of childbirth. One of the most important things we can do in the reduction of maternal mortality is to train and instruct the midwives. They are delivering almost 50 per cent of the babies born in Mississippi at the present time. The fact that the majority of this number are colored should make no difference at all.

Quite a number of conferences were held last year, and in these conferences the family physicians have been playing a part. In almost every conference held in Mississippi the local physicians were able to take a part and they expressed very definite interest in and approved the work. So with these conferences and with the training and supervision of midwives we feel that the infant mortality rate will continue to decrease in Mississippi and that the maternal mortality rate will begin to decrease.

Dr. Greer Baughman, Richmond, Va.—I have been very much interested in the work that the Board of Health is doing and is planning to do. It so happened that in 1920 I gathered together the statistics of the outside obstetrical service of the Medical College of Virginia. There were 2341 cases of maternity. In that number we had nineteen deaths. Seven of those deaths were due to nephritis and eclampsia, hence preventable. Our death rate from sepsis is negligible. We practically have none. We had 2.2 per cent of eclampsia, which is a very high incidence. I found only one city with a larger incidence of convulsions than Richmond and the surrounding country, Leipzig, Germany, where the rate was not quite 3 per cent. I am particularly in sympathy with the plan of getting in touch with pregnant women early by means of literature, clinics, etc. When this bill was first suggested I was not particularly in favor of it, because I felt that the Government was doing a little too much tinkering with the doctors. But since the bill has been put through, I have been in contact with what has been done in Virginia. I have seen the literature these ladies are getting out and the work they are doing and I feel that they should have the hearty cooperation of every intelligent physician in the State. I believe the plan of instruction that is being carried out is going to help us by lowering our mortality. From being a doubting Thomas before the bill was passed I have become a very strong advocate of it. In our locality I have charge of a clinic which is like the neck of a bottle through which a great deal of bad stuff passes, not only from Richmond but from the State and from far-away places, even as far as North Carolina. It is the exception that we find a woman with eclampsia who has been in contact with a doctor at all or with a clinic. The work of education is our arm pushed out a long distance to force women to save themselves.

If this plan of education will reduce the number of eclamptics by a half, then the death rate over the country will be reduced at least a third.

Dr. Watters (closing).—I think Dr. Baughman's account of the success of the work in Virginia is enough to close the discussion. I want to thank him for his cooperation, and I wish that we had more obstetricians like him.

SURGERY

RAILWAY, INDUSTRIAL, GYNECOLOGICAL, OBSTETRICAL AND UROLOGICAL

TUMORS OF THE CAROTID BODY*

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My object in offering this title is two-fold: first, to put on record a case of tumor of the carotid body with operation and recovery after a three-year period; and, second, to gather from available literature the composite experience of surgeons reporting such cases and to formulate, if possible, definite plans for clinical guidance. At this time we are better prepared than formerly to develop conclusions concerning tumors of the carotid body through careful study of some important papers published during the last two or three years. There are yet many differences of opinion. Upon a few points, however, all are more or less agreed, chiefly upon these: that carotid tumors are very infrequent, that their pathology is varied, that the physical signs are inconstant, and that the diagnosis is difficult. It will be my purpose to bring evidence to bear for the solution of these problems and for further enlightenment upon the questions at issue.

First I shall give a brief account of my own case:

A colored woman, twenty-seven years of age, presented herself at St. Agnes Hospital on account of a swelling in left cervical region. She stated that the "knot" had been present for several years, that it was growing rather gradually, and that it had given little or no pain, but that her doctor "thought it ought to come out." It had been pronounced a tuberculous gland, since that disease had existed in the family. There was a mass on the left side of her neck of the size of a baby's fist. It was situated midway between the lower jaw margin and the clavicle and just anterior to the sterno-mastoid muscle. It was more or less fixed, with little movement in either direction. It was slightly tender, somewhat soft and even semi-fluctuating—all strongly suggestive of a tuberculous gland. There was also a lobulated sensation upon palpatory pressure. A general physical examination proved negative. No definite pre-operative diagnosis was made, but we were inclined to agree in the opinion that it was a case of tuberculous adenitis.

Operation was performed October 28, 1920. An oblique incision was made from above downward, along the anterior border of the sterno-mastoid muscle. As soon as the mass was exposed, it was recognized as a tumor of the carotid body on account of its color and its location at the carotid bifurcation. I attempted to free the growth from the artery, but it was impossible to do this without injury to the vessel. In fact, when the tumor was almost enucleated the artery was torn and a sharp hemorrhage occurred. This was quickly controlled and of necessity the common carotid artery and both of its divisions were ligated.

Three-fourths of an inch of the larger vessel were resected and removed along with the growth. The pneumogastric nerve was not encountered.

The operation was difficult, but the wound was closed without drainage and the patient recovered without complications. For a few days she was inclined to be stuporous. This condition promptly subsided, leaving her mind normal within a week. She went home three weeks after the operation and now more than three years afterward is perfectly well. During the first year following the operation she felt, when she put anything like an apple in her mouth, "the same as a person who has the mumps." Within the past month her neck "feels a little full sometimes and gets a little sore." There has been no recurrence of the growth.

The tumor, after removal, was examined by Dr. C. A. Shore, Director of the Laboratory, North Carolina State Board of Health. The growth measured 3 by 2½ inches. It was of soft consistence, a network of capillaries with fine connective tissue fibers. It was of the type known as a "perithelioma." The common carotid artery ran straight through the tumor.

Historical Note.—The carotid body is not a new discovery. Its existence has been known since 1743, when von Haller found it and described its relations and its macroscopic appearance. In 1862, 119 years later, Luschka noted its constant occurrence and made the first microscopic examinations. It appears that Riegner, in 1880, was the first to remove a tumor of the gland, and that he called atten-

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tion to the malignant tendency of such growths. Paltauf described this unusual type of tumor in 1891, while Marchand about the same time, and quite independently, published similar observations. Since that year, and up to 1922, a number of surgeons have reported cases, no operator showing more than three, until a total of over 90 has been reached. "In spite of the cases since reported," says Klose, "the etiology, the histologic characteristics and the clinical symptomatology are still more or less obscure." No stronger reason could be advanced for adding to the list every case that comes under observation.

Nomenclature.—The exact nature of the little organ under discussion has been so uncertain that many and divers names have been bestowed upon it. Here are some of them: intercarotid ganglion (von Haller), Luschka's gland, intercarotid arterial glomerulus (Arnold), the perithelial organ (Waldeyer), carotid paraganglion (Klose), intercarotid paraganglion (Balfour and Wildner), carotid ganglion, carotid body. Most of these names seem to vary according to different conceptions of position, structure or function. In the absence of more definite knowledge, carotid body seems to be the safest term to employ, as it expresses nothing except presence and relation.

Anatomy.—When von Haller stated 180 years ago that he found a nodule about the size of a kernel of wheat at the bifurcation of the common carotid artery, that it was set in the sympathetic nerve plexus around the artery and almost fused with its wall and called it the "intercarotid ganglion" because he regarded it as a nerve structure, he little knew that at the present day and time his views, with some modifications, would be confirmed. But such seems to be true (Wildner). Luschka's microscopic findings also have been substantiated: large cells in clusters surrounded by thin capillaries and sympathetic nerve fibers suggested to him their analogy to the adrenal bodies, the anterior lobe of the pituitary, and other ductless glands. There has been disagreement, however, among modern histologists in regard to the character of the cells and blood vessels and the question of their close relation with the nerve fibers.

Physiology.—The function of the carotid body is certainly not known. Its juice has been found experimentally to kill a rabbit in a few minutes and small doses will depress the vascular system, which is just opposite from the action of adrenalin. Bilateral removal of the organ has produced glycosuria and fatal cachexia. Undoubtedly the carotid body belongs to the sympathetic ganglia.

Pathology.—Diseases of the carotid body, so far as known, consist only of tumor formation peculiar in structure and uniform in type. These tumors may vary in size from that of a pea to that of the adult fist. They may be hard or soft, depending on the predominance of fibers or cells, the latter being of the so-called chromaffin variety and of the same character as those found in the composition of certain ductless glands and sympathetic nerve ganglia. The appearance of carotid tumors is similar in all cases reported, but variations occur in color, density and form arrangement according as the capillaries, fibers or lobules are in excess. They must be regarded as benign tumors, as they are of slow growth, perfectly encapsulated, and do not form metastases. Recurrences, however, are not uncommon, especially when the tumors are simply dissected from the carotid vessels and are not thoroughly extirpated. The carotid body is now and then the seat of primary malignant growth, as sarcoma and carcinoma, but these, of course, are not true carotid tumors and should not be classed with them. Undoubtedly some of these may have been benign in the early stage. Pathologic interest centers around the "specific tumor cells," whose derivation is still a matter of dispute, though there is general agreement that the tumor is merely an enlargement of an otherwise normal gland and not a genuine new growth (Klose).

Clinical Signs and Diagnosis.—In very few instances has the diagnosis of carotid tumor been determined before operation revealed the real character of the growth. This indicates that the symptoms are obscure and that the condition is not suspected as often as it should be. The fol-

lowing summary of the signs (given by Klose in a recent paper) emphasizes the essential points:

(1) Location at the bifurcation of the common carotid.

(2) Good lateral mobility with limited vertical mobility.

(3) Ovoid form, a superficially uneven surface and firm elastic consistency.

(4) Expansile pulsation with systolic bruit, both disappearing after compression of the common carotid.

(5) Anterior arching of the wall of the pharynx and paralysis of the vocal cord.

(6) Occasional narrowing of the pupil on the diseased side.

(7) Slow growth and protracted duration.

(8) Painlessness under palpation.

Isidore Cohn (Am. Jour. Syphilis, Vol. II, No. 1, January, 1918) mentions the following conditions for differentiation from carotid tumor: primary lymphosarcoma, metastatic carcinoma of the lymph glands, aneurysm, gumma, tuberculous cervical adenitis and aberrant thyroid.

Treatment.—The high operative mortality, the apparently innocent nature of the growth, the almost constant necessity of ligating the common carotid artery and of injuring other important structures have led some good surgeons to doubt the advisability of recommending operation for carotid tumor. It would seem wise, however, to perform an early and complete removal. Later reports do not bear out the mortality of 27 per cent prevailing fifteen years ago, and it is certain that if the tumors are allowed to remain indefinitely, pressure symptoms of a serious character will develop, not to speak of the incidence of malignancy. It is true that post-operative disability is not uncommon, but this occurs usually in the advanced cases which offer more danger, both present and future, than the earlier ones. Prompt recognition and early removal, even at the expense of resection of the large vessels, appears to be the only rational plan. The operation may be done in two stages, according to Halsted's plan, by first ligating the common carotid artery, and then waiting some days before extirpating the growth. No case successfully treated by medication or radiation has so far been recorded.

Recent Reports.—Since the publication of Mont R. Reid's paper in June, 1920, the most comprehensive review of the subject is a contribution of H. Klose,[1] from which I have already borrowed freely. He presented two cases and collected 75 cases from the literature. His personal cases have been abstracted as follows:

Case I.—A 60-year-old man noticed at the age of 39 years a swelling of the left side of the neck, following violent excitement. In the next ten days this grew to the size of an egg, with pressure sensations and throbbing in the region of the left temporal region. When, in 1902, a surgeon attempted to extirpate the swollen "glands" a severe hemorrhage arose and could not be checked for some three hours. The swelling thereafter increased to its present size, which had not changed in the ten years preceding examination, except for temporary enlargement occasioned by strong emotion. The tumor which lay in the left angle of the carotid and was larger than a man's fist extended to the level of the horizontal branch of the maxilla. It had three lobes, was painless, showed expansile pulsation and systolic bruit and could be gradually compressed into the size of an egg. The skin over the tumor was pigmented. The growth was mobile in the lateral direction, but not in the perpendicular. There were no functional disturbances of the corresponding nerves of the brain or of the larynx up to the time of writing.

Case II.—A woman 30 years of age had had for eight years a slowly enlarging tumor on the left side of the neck. There were no subjective symptoms and treatment was sought merely for cosmetic reasons. Examination showed on the left side of the neck extending to the maxillary angle a firm enlargement the size of an apple. The tumor, which had an irregular surface, was mobile in the lateral but not in the perpendicular direction. The skin over the tumor could be lifted easily. There was a palpable expansile pulsation and an audible systolic bruit. The left posterior pharyngeal wall projected in the anterior direction. The larynx was shown to the right and the left vocal cord was in the cadaver position. Aneurysm of the common carotid artery was at first suspected, but no etiologic factor could be found and the tough consistency did not harmonize with this diagnosis. After several days' observation, the peculiar expansile pulsation led to a suspicion of tumor of the carotid.

Operation.—An oblique incision above the tumor exposed the common carotid artery in its lower third, the blood stream being checked by elastic strangulation. The common carotid artery and the jugular vein were so firmly surrounded by the tumor that isolation of these blood vessels was impossible. After double ligation the vessels

were therefore divided and the tumor further released from its surroundings. The vagus nerve could be dissected out freely, but it was impossible to spare the laryngeal nerve, the hypoglossal and the descending branch of the hypoglossal. In caring for the numerous blood vessels radiating from the upper border of the tumor, one noticed that neither the external nor the internal carotid was present. In the upper pole the knife encountered tumorous tissue which infiltrated into the neighboring region. After the hemorrhage was carefully checked, the wound was sutured in the upper portion and tamponed in its lower angle. The operation was well tolerated. In the following days hoarseness, obstruction of the upper respiratory tract with mucus, myosis of the left eye and blepharophimosis were present. The pulse mounted to 120. The tachycardia increased and the patient "swallowed the wrong way" frequently, but the wound healed by primary union and after fourteen days she was discharged. There was still some limitation in the mobility of the head, the voice was still somewhat hoarse, though improved, and the paralysis of the left vocal cord was, of course, still present.

Cases not included in Klose's report and others since published include one by Descarpentries, two by Edye, one by Keynes, and one by Fedeli. Brief abstracts of these may be given.

Descarpentries[2] gives the subjoined account of his case:

A woman 38 years old entered the hospital with a diagnosis of adenitis of the neck. The tumor, which was located on the left side of the neck, and was as large as an apple, had been gradually growing for the last ten years. It was not painful and the patient came because of esthetic reasons only. There was no souffle nor pulsation or any other symptom of aneurysm. Puncture elicited dark blood. Because of the slowness of the evolution, the mobility of the skin and of the deep planes, and the practically smooth surface, a diagnosis of lymphosarcoma, secondary neoplastic adenitis, or malignant branchioma was rejected, and lipoma was eliminated because the surface was too regularly rounded. The location was too high for goiter and too low for a tumor of the submaxillary gland. As a last resort the case was diagnosed as chronic adenitis.

Operation.—After separation of the internal jugular vein, the common carotid was attached. It was closely associated with the tumor, but could be isolated. The vagus was easily isolated, but the internal and external carotids seemed to originate at the tumor. From the slow development of the tumor, it was probable that collaterals had developed to supply the cerebral circulation. The writer therefore decided to sacrifice the blood vessels. The common carotid and the superior thyroid artery were sectioned between clamps. The external carotid was then ligated and cut. Hemorrhage from the central end showed that retrograde circulation occurred from the internal to the external carotid, after ligature of the common carotid. The internal carotid was then ligated and the tumor detached from its bed. The patient recovered, but only after pronounced symptoms manifested by aphasia and paresis of the right limbs and of the left facial nerve. The patient could not write her name until three weeks later. At the last news she was doing well and had resumed her work, but her memory was defective and she still stammered when she tried to speak rapidly. The histologic examination showed the characteristic structure of tumor of the intercarotid gland. There were no traces of malignancy and the picture bore a strong resemblance to the normal gland. Chevrier in the discussion reported that he once diagnosed tumor of the carotid chiefly because of the apparent location between the carotids. He noticed, however, some isolated masses in the inferior carotid region and in the lower anterior carotid region. These he took to be secondary ganglia, although in view of the usual benign character of these tumors, this was a surprising phenomenon. The tumor, moreover, was very hard. At the operation he discovered that the anterior artery taken for the external carotid was not the latter, but instead a very large abnormal artery which had developed in front of an aberrant goiter. The histologic examination confirmed the diagnosis of goiter. (The Chevrier case shows that in the presence of a very hard tumor of the intercarotid region, aberrant goiter or branchioma should be suspected as possibilities.) Lecene, after examining the Descarpentries specimen, stated in the discussion that the structure seemed to indicate that attempts to shell out these tumors from their capsules would usually result in incomplete extirpation.

The case described by Keynes[3] is that of a woman of 31, who had noticed a lump in the right side of her neck for rather over two years, and had had transient but severe attacks of aching pain in the left side of her neck and face. She was thin, had a poor appetite and slept badly. There was a solid tumor of very hard consistency lying deep to the left sternomastoid muscle and extending from the angle of the jaw to the level of the cricoid cartilage. It could be moved from side to side, but was fixed in the vertical plane. Arterial pulsation could be felt, but it was clearly transmitted and not expansile. The diagnosis was in doubt, but an exploratory operation was done. The tumor was exposed and found to be encapsulated and very hard. It was easily freed from all the neighboring structures except the carotid vessels, all three being completely surrounded by the tumor. It was evident that the tumor could be removed only after ligature of all these vessels. As all the risks attending this procedure had not been explained to the patient, it was felt that the operation could not justifiably be completed at this time. The wound was closed, to be reopened a week later, when the tumor was easily removed after ligature of the common carotid, of the internal carotid and of the individual branches of the external carotid as they emerged from it. It was intended first

to ligate the internal jugular vein as advised by Makins (On Gun-Shot Injuries to the Blood Vessels); but after freeing the tumor from the adhesions which had formed since the first operation severe hemorrhage from its surface occurred. This could not be easily controlled, owing to the hardness of the growth, and the main vessels, therefore, had to be ligated as rapidly as possible. There did not seem to be any point after this in prolonging the operation by ligating the vein. After operation the patient suffered from no symptoms of interference with the functions of the left cerebral hemisphere. She made an uneventful recovery. Examined at subsequent intervals, she showed no signs of weakness or of recurrence. A paresis of the left *depressor anguli oris* due to section of its nerve-supply was gradually disappearing.

The writer points out that, though in many of the recorded cases the growths were definitely malignant, there is some evidence to show that they were innocent in their early stages. "The history of this case encourages the belief that a carotid body tumor, if diagnosed early enough, may be successfully treated by complete removal, with ligation of all the carotid vessels."

These are the two cases reported by Edye:[4]

Case I.—A grazier, aged 27, was operated upon by Dr. G. H. Abbott. The history was that of a painless swelling on the right side of the neck below the angle of the jaw. The tumor was the size of an egg, firm to touch, not tender, and not adherent to the skin. When exposed at operation it was found to be extremely vascular and to involve the carotid vessels and vagus nerve. To remove the tumor it was necessary to excise portions of these structures. After operation the voice became harsh and there was paresis of the right side of the tongue, but otherwise the recovery was satisfactory. Eight years later the patient reported that he was quite well.

Case II.—A farmer, aged 38, was operated upon by the writer. The tumor was first noticed two months before and had grown slowly. It was situated on the left side below the angle of the mandible and could be moved in an anteroposterior, but not in a vertical direction. There was no pain or tenderness. At operation the tumor was seen to have very vascular connections and to be so intimately associated with the internal jugular vein, carotid vessels, and vagus nerve that portions of these structures had to be removed with it. The tumor extended along and ensheathed the internal carotid artery. After operation there was no alteration in voice and no evidence of cerebral injury, but examination of the larynx revealed paralysis of the left vocal cord. Six months after the operation the patient reported that he was well and he was believed to be still in good health. "Microscopically both specimens have the structure generally recognized as belonging to tumors of the carotid body, namely, clusters of large, polyhedral cells of an epithelial type, separated by a fibrocellular stroma which in some parts is abundant and dense. The cell groups are supported by well developed capillaries."

Fedeli[5] illustrates the findings in a tumor removed from the bifurcation of the common carotid in a man of 59, and gives brief summaries of 90 cases in the literature. In 7 the tumor was a necropsy surprise. He remarks that nearly every one who has studied these tumors has given them a different name, as there is still so much uncertainty as to the significance of the carotid body.

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DISCUSSION

Dr. Hermann B. Gessner, New Orleans, La.—It is said that if the common carotid is ligated under forty years of age there is a mortality of 10 per cent, while in the cases past forty the mortality is 25 per cent. Dr. Rudolph Matas has given us a test for the circulation of any artery which is very easily applied and very satisfactory.

It consists of applying an aluminum band which can be clamped down on an artery and buried. If poor circulation follows it is comparatively simple to reopen the wound with some simple instrument, pry apart the lips of the band and take it off. I have had the experience of applying this band in an aneurysm in the cavernous sinus. I do not know whether you are familiar with this aneurysm, but if you auscultate the temporal region of a person with such an aneurysm you will hear a noise which sounds like a boilermaker hammering on a piece of iron. In this case I applied the aluminum band to the carotid artery. In the course of six hours the patient became comatose and had a hemiplegia of the opposite side. Without any anesthetic I reopened his wound, pried apart the lips of the band with a chisel and removed the band. The patient almost at once had a violent convulsion and I thought he had gone away to stay, but consciousness returned. The presence of the band seemed to have done no harm at all. After removal one could not tell where there had been any pressure at all. If a ligature had been applied and the intima of the artery had been injured, thrombosis and embolism would probably have followed.

The band gives us an excellent means of testing the circulation in a case over forty with symptoms referable to the common carotid. I have applied the band where no disturbance of circulation followed and I was able to leave it

with no symptoms whatever. I wish to suggest that in these cases instead of ligating the common carotid it may be well to test the circulation by means of the band and in that manner reduce the mortality.

RADIATION IN THE FEMALE BREAST BEFORE AND AFTER OPERATION*

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It is impossible to furnish statistical data comparing the results in patients operated upon for cancer in whom no radium or x-ray treatment was used, in patients operated upon after x-ray or radium exposures had been made, and in patients treated with x-ray or radium after operation. Such a short time has elapsed since the use of radium in cases operated upon that it cannot yet be determined whether there have been any permanent cures. The post-operative period has not been sufficiently long.

Every one who has used radium appreciates its great help in the treatment of cancer. In the beginning its use was limited largely to inoperable cases and the good results in such cases encouraged its use in borderline cases, and later, in cases of early cancer in which the operative risk, because of some organic or constitutional disease, seemed to be increased.

The immediate results in these supposedly inoperable cases and in borderline cases were certainly encouraging, but in tracing these cases it has been found that although many patients lived for several years, all died from cancer eventually. Only a certain percentage of patients treated early lived through the five-year period. It was also learned that certain cancers which responded poorly to operation responded quickly to radium, and for this reason the use of radium in the treatment of cancer has increased by leaps and bounds.

Surgeons have been slow to use radium alone in treating early cancer because surgery offers excellent results in such cases. For instance, in cases of epithelioma of the lip, from 90 to 95 per cent of the patients properly operated upon before the disease has extended to the glands of the neck, remain well. In a recent review of 218 patients with cancer of the breast it was demonstrated that, when radical operations were performed before the axillary glands became involved, 64 per cent were alive from five to eight years afterward. Of 6 patients who had had only simple amputation of the breast for supposed mastitis, which later proved to be cancer, 4 (66.66 per cent) were alive from five to eight years after operation. The fifth patient died four years after operation, but the cause of death could not be ascertained. The sixth was well and without recurrence two and one-half years after operation, but could not be traced later.

Intra-abdominal cancers at the present time certainly seem to respond to surgery better than to radium or x-ray. Radium, however, has proved remarkably efficient in treating cancer of the cervix, and statistics show that many patients can be cured for a five-year period through its proper application in early cases.

MacCarty, in a study of the tissue reactions in cancer, has found that patients who show active resistance to cancer through tissue changes have a longer life expectancy than those who show little or no resistance. Such reactions consist in an increase of the fibrous and hyaline tissue, in leucocytic infiltration of the tissues surrounding the growth, and in differentiation of the malignant cells. By actual study of the duration of their post-operative life, MacCarty found that patients who have all these evidences of resistance live longer than those who have little or no resistance. Careful studies made by Alter, Ewing and others of growths and tissues which have been subjected to radium show changes almost identical with those noted by MacCarty. It has been impossible to determine whether these tissue changes result from exposure to radium, or from efforts of Nature to surround the carcinomatous cells which have been killed by radium. The good results which

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follow the use of radium are very probably due both to the actual destruction of carcinomatous cells and to the tissue reactions which follow its use.

Practically all cancers metastasize to glands. The time at which metastasis occurs varies greatly in different patients, probably owing to the resistance of the tissues surrounding the growth. It probably results from a microscopic liquefaction within the growth, which allows carcinomatous cells to pass out in all directions to the lymphatics draining the malignant growth. When metastasis has occurred, only a small per cent of the patients can be cured by either surgery or radium. This has been true in our own experience with surgery, and we also have found it practically impossible to cure patients with radium after the glands are known to be involved. Surgery in many instances prevents a recurrence of the growth at the site of the operation and in tissues from which involved glands were removed, but internal metastasis is common. For instance, in cases of cancer of the breast in which there is involvement of the axillary glands, many patients die from metastasis in the chest, abdomen or elsewhere, who show no evidence of recurrence at the site of operation or in the axilla. It is very doubtful whether radium will offer more in such cases than surgery, as its use in known internal metastasis is of little or no benefit.

For many years we have used the x-ray following operations for cancer, believing that it would produce tissue reactions which would retard the growth of recurrences and that it might kill carcinomatous cells at the site of operation.

At present, although we have no statistical data to bear out the assertion, we believe that no special good comes through using radium or x-ray just prior to operation. In advanced cases in which it has been used in this way it has not seemed to improve the end results attained by surgery alone. In such cases it often was possible to tell from the appearance of the tissues at the time of operation that radiation had been used because they appeared red, injected and often edematous.

We intend to treat a group of patients with radium as though no surgical treatment were to follow, and, after waiting for a period of two or two and one-half months, in order to obtain the complete effect of the radium and to permit the tissue changes which follow its use, to operate as though radium had not been used. We hope thereby to obtain the full effect of radium and operation, and believe that, after the tissues have been prepared in this way to resist cancer, the chance for recurrence may be diminished. It seems possible that such a method might give better results in cases in which operation is performed before the glands have become involved. After involvement of the glands, on account of the great possibility of distant metastasis, it is doubtful whether the results will be improved.

The results in four patients with advanced cancer of the breast recently treated in this manner have borne out this belief. All showed extensive involvement of the axillary glands, and the condition was definitely inoperable in the beginning, but the malignant process was checked by the radium to such an extent that it became operable in every case. Although extremely large doses of radium had been used for months in each of two cases in which operation was performed, cancer cells were found in the growth and axillary glands at operation. One patient very shortly after operation developed general metastasis. Two other patients, although brought to an operable state by radium, developed internal metastasis before operation. I might also mention here another patient with cancer of the breast who had also cancer of the uterus, a large goiter and chronic endocarditis. The cancers of the uterus and breast were treated with radium. Both growths responded well. About a year afterward, although radium had been applied on several occasions, simple amputation of the breast was performed. The growth, which apparently had been completely checked by radium, was found to show definite carcinomatous cells. Such cases would lead one to believe that it often might be possible to demonstrate carcinomatous cells, which are incorporated in hyaline and fibrous tissues in growths which ap-

parently had been destroyed by radium.

When we consider the excellent results obtainable through surgery or radium in early cases, it behooves us to make greater efforts to educate the public with regard to the importance of having careful examination when the slightest symptoms of cancer develop. At present many cases are inoperable when medical aid is sought, because the malignant process has produced no symptoms until that time. It is not uncommon to see extensive involvement of the axillary glands when cancer of the breast is first noticed, and many cases of cancer of the stomach are inoperable when symptoms first appear. On the other hand, many patients die each year through failure to consult a competent physician in regard to cancers which have produced symptoms for a long time. It is really appalling to note how extensive many cancers are when physicians are first consulted. In the group of cases of cancer of the breast mentioned, it was found at operation that 60.5 per cent of the patients had involvement of the axillary glands, 20 patients ulcerating cancers, and 16 patients diffuse cancers, involving the entire breast.

As good results may be obtained from treating cancer both by radium and surgery, all patients should be given the advantage of both agents when possible, and until it is proved that cancer can be permanently cured by radium, we should not give up surgery in favor of radium. We should work toward the perfection of some method which will afford a combination of the good possible through either radium or surgery used independently.

RADIATION IN THE TREATMENT OF CARCINOMA OF THE BREAST*

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It is clearly the duty of every physician to enter the fight against cancer. The general practitioner can accomplish most by teaching in his daily rounds the importance of a medical examination of every new growth at its very beginning. When the physician is in doubt as to its nature, and there is an opportunity, he should confer with some one who has had greater experience in the special field involved.

One of the greatest difficulties that is met by the general practitioner is the fear of an operation on the part of the patient. This fear is not confined to the ignorant. Within the past two weeks I have had the wife of a surgeon referred to me by Dr. John B. Deaver. The patient had an advanced carcinoma, with about three-fourths of the breast involved, and large lymph nodes in the axilla. This patient had concealed this disease from her husband for a year, and had only brought it to his attention one week before she was sent to me.

This fear can be partially overcome if it is made known that radiation can also be used to cure cancer.

The diffusion of such knowledge increases the responsibility of the radiologist, and such responsibility should not be accepted lightly. He should be satisfied that he is giving the patient the best chance. He should be sure that he has mastered the best technic and that he has developed sufficient skill to handle the particular case. The possession of a large x-ray equipment, or the possession of a large quantity of radium, is no more of a guarantee of skill than the possession of a complete set of surgical instruments is a guarantee of skill on the part of the surgeon. The fact that skill in radiology is just as essential as skill in surgery is not sufficiently appreciated.

The roentgen rays and radium rays are powerful for harm as well as for good. The more powerful, the greater is this danger. On the other hand, insufficient treatment is also a danger because this allows the disease to progress.

I would like to recommend that every patient with carcinoma of the breast, so far as is practical, be seen by the general practitioner, the radiologist and the surgeon. A conference between these three will result in the best possible advice, whether it be treatment by operation alone, or pre-operative radiation followed

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by operation, or operation followed by radiation, or radiation alone. The radiologist will then know the conditions before they have been influenced by surgery and will be in a better position to attack the disease thoroughly.

For example, Dr. John B. Deaver, the family physician, and I commonly confer in just this manner, and we are not always able to come to a conclusion at the beginning. In such instances we give radiation and in three or four weeks decide upon the next step.

In some cases, what seemed to be definitely carcinoma at the beginning has disappeared within a month, and we are led to believe that it was a case of mastitis.

CHRONIC MASTITIS

I have had sufficient experience with mastitis to convince me that most if not all of these patients can be cured by radiation. In just so far as we cure the cases of chronic mastitis we prevent the carcinomas that follow this condition.

Ewing[1] says: "I find that a very large proportion of mammary cancers occur in breasts which are the seat of chronic mastitis" and "very few cancerous breasts fail to show phases of chronic mastitis in the outlying portions."

Ewing[1] refers to 295 cases of various types of chronic mastitis collected by Speese, in which 15 per cent were reported as showing carcinomatous changes, and in his own material about 50 per cent of the breasts excised for cystic disease showed precancerous changes or miniature carcinomas. Therefore, if we can cure cases of chronic mastitis we eliminate a considerable number of cases of cancer.

CANCER OF THE BREAST

We must, for purposes of consideration of treatment, divide the cancers of the breast into:

(1) Primary cancer of the breast, in which the palpable disease is confined to the mammary gland.

(2) Primary cancer of the breast, with palpable lymph nodes in the axilla.

(3) Primary cancer of the breast, with distant metastases, such as involvement of the mediastinum, lungs, bones, etc.

(4) Recurrent carcinoma in the mammary area, with or without metastases.

(5) Distant metastatic carcinoma without local recurrence.

Before considering each of these classes separately, let us discuss pre-operative and post-operative treatment.

PRE-OPERATIVE AND POST-OPERATIVE RADIATION TREATMENT OF CARCINOMA OF THE BREAST

The object of pre-operative treatment is to devitalize the cancer cells so that they cannot easily develop locally or so that they cannot easily grow if transplanted during the operation. Several experiments to show that such action takes place in cancer tissue exposed to the x-rays will be found recorded in the book by Colwell and Russ[2] on "Radium and X-Rays and the Living Cell."

In a series of experiments made by Wedd, Chambers and Russ with an adenocarcinoma of the mouse, they showed definitely that this devitalizing effect takes place. A thin slice of tumor about 2 mm. thick was placed between two sterilized sheets of mica. The tumor was moistened with normal saline and enclosed by a vaseline ring to prevent evaporation. This was then placed between two radium capsules giving an intensity of radiation equal to 2.2 milligrams of radium bromid per square centimeter. An initial exposure, lasting four hours, to the composite rays from the radium prevented the subsequent growth of the tumor when it was transplanted into five mice, a control portion of the original tumor "taking" in all of the inoculations.

Nogier, Jaubert, de Beaujeu and Contamin[3] have shown the direct effect of x-rays upon the cells of a mouse tumor, an epithelioma of glandular type (adenocarcinoma). The tumor upon removal from the animal was minced and then exposed to x-rays, after which it was inoculated into normal mice to see whether it would grow. When using rays of a quality of which 50 per cent were absorbed by the tumor tissue, they found no positive, and 15 negatives; while the controls gave 14 positives and only 1 negative.

The first of these series of experiments shows that radium and the second that the x-rays devitalize the cancer cells and tend to prevent their growth when reinoculated.

Murphy[4] and his associates at the Rockefeller Institute in 1921, as a result of experiments, found that a cancer graft will rarely grow when inoculated into a region which has previously been exposed to an erythema dose of x-rays, while grafts of the same tumor grow actively in unradiated parts of the same animal. More recently, Nakahara[5] found, at the Rockefeller Institute, that cancer cells implanted in a skin region previously exposed to an erythema dose of x-rays show a series of degenerative changes in every way comparable to the frequently described stages of cancer cell degeneration following the x-rays. The findings contrast strongly with the survival and growth of grafts implanted in unexposed regions in the same animal.

Therefore these two lines of experiments indicate that the radiation not only devitalizes the cancer cells, but also renders the tissues less favorable for inoculations.

All radiologists have seen malignant disease disappear under the influence of radiation. Every one recognizes the destructive effect upon malignant cells. Therefore, since those clinical observations and experimental investigations show a devitalizing effect upon malignant cells, we are justified in recommending that the rays be used for this purpose preceding operation, as I have been recommending[6] since 1916.

The object of the post-operative treatment is further to devitalize the cancer cells and to prevent the growth of the newly implanted tumor or of the remaining cancer cells which may have escaped the surgeon's knife. The rays also tend further to devitalize the metastatic lymph nodes in the neighborhood of the tumor and gradually to encapsulate them by fibrous tissue.

Appolant concluded on histological grounds that the destruction of the carcinoma cells was not a sequel to the proliferation of the connective tissue cells, but it was due to a direct action of the rays upon the parenchyma.

As the result of a number of experimental investigations Contamin came to the following conclusions:

(1) The action of the x-rays is greater, the younger and more actively growing the tumor is; (2) the disappearance of a large tumor causes the death of the animal, probably by intoxication. The disintegration product of the cells which have been injuriously affected by the rays is eventually absorbed by the body. In the case of excessive quantities this leads to a state of intoxication.

Clinically, all of us have seen recurrent cancer tissue disappear under the action of radiation. All acknowledge that the younger the tumor the greater will be the action upon the cancer cells. These clinical observations and the experimental evidence which has been produced argues strongly in favor of the post-operative treatment to be given just as soon as practical after the operation, which is usually possible at the end of about two weeks. Prompt post-operative treatment is especially important if no pre-operative treatment has been given. If pre-operative treatment has been given, then the post-operative treatment should be given one month after the original treatment if the lower voltage treatment has been used, or two months if the higher voltage has been used.

In January, 1922, before the Suffolk County Medical Society, Boston, I described the technic for low voltage which I had used for a number of years, as follows:

"For the pre-operative treatment I usually use three portals of entry for the rays, divided as follows: a line corresponding to a horizontal line drawn through the anterior surface of the chest on a level with the lower border of the axillary fold.

"A corresponding posterior horizontal line drawn through the level of the spine of the scapula. This gives the outline of the supraclavicular area to be treated. The area below the anterior horizontal line forms the upper border of the mammary area to be treated. The posterior border of this mammary area is marked by the mid-axillary line. The rays are then directed through each of the three areas bordered by these three lines and directed toward the disease in the breast, the axilla, the supraclavicular and medi-

astinal regions. If one notes carefully, he will find that these rays are crossing to the greatest possible amount in the deeper tissues with the least waste of energy. I am using 6 millimeters of aluminum filter, 9-inch parallel spark gap, at a focal skin distance of 40 centimeters, for a period of 40 minutes. Each of these three areas is covered within one week, that is, we try to treat the patient on alternate days. This is all that the patient can stand without producing radiation sickness. Each application is the equivalent of two-thirds of an erythema dose. Each of these areas is treated again during the second week so that the second radiation over each area is given a week from the first and each of the three areas receives two of these treatments within a period of two weeks. In other words, 1 1/3 erythema dose of deep radiation is given within a period of two weeks. If one adds to the direct action of the rays to these areas the secondary effect from the treatment through the other two areas, we must conclude that we are probably getting during this first two weeks approximately two erythema doses, which is more radiation than could possibly be carried into the tissues by any other method. Some one may criticise this technic because a full erythema dose is not carried into each of these fields immediately, but by such process one would probably produce dermatitis and would certainly not be able to give more than half the amount of radiation within a period of a month. This technic has been developed after much experience, but will probably be modified in the near future."

Shortly after this I began the use of the high voltage (200,000) x-rays. With these rays I have established no routine as yet, but I try to adapt the treatment to the individual case, taking the greatest precaution to protect the pulmonary and other normal vital tissues.

(1) In primary carcinoma of the breast without palpable lymph nodes, we are justified in recommending a pre-operative course of deep x-ray therapy, to be followed in two or four weeks from the beginning of this treatment by surgical excision. The course of pre-operative treatment will require a period of about ten days to two weeks, in order to avoid any constitutional symptoms. If the patient is from out of the city and time is important, the operation can usually be performed within 48 hours after the last dose. With some risk of radiation sickness the treatment can be crowded into four to six days.

The treatment so far as possible should be directed into the mammary tissues, the axillary and supraclavicular glands with the avoidance of the lung tissue so far as is possible if high voltage x-rays are used. This is no easy task, and must be adapted especially to each individual patient.

The detailed technic will depend upon the special equipment at hand. A second course of x-ray treatment should be given to the operative field and the glandular area. If the low voltage rays (130,000) are used the second course of treatment can be given about four to six weeks after the first course began, and if the high voltage rays (200,000) are to be used the second course of treatment should not be given inside of two months. It has been my practice, during several years, not to give more than two courses of treatment unless there is evidence of recurrence or metastasis. I believe we should limit radiation so far as is practical.

We have had too few of these early primary cases treated by radiation alone, and the treatment by modern technic has extended over too short a period to enable us to draw any definite conclusions. The results are, however, very encouraging. It is reasonable to expect that when we have been able to cause the disappearance of recurrent and metastatic disease, and advanced primary disease, we should be able to cause the disappearance of early primary disease. Surely the earlier a cancer of the breast is treated by any method the better are the chances for recovery.

Today it is pretty generally recognized that a woman with carcinoma of the uterus has a better chance with radiation than with operation, providing the radiation is thoroughly and skillfully given.

Likewise, I believe that, when the technic will have been properly developed, carcinoma of the breast will be treated by radiation in all stages. We are not prepared to make this recommendation now, however, though Ewing several years ago expressed the opinion that a woman had a better chance for prolongation of life if treated skillfully by radiation than if treated by operation in any stage of the disease.

(2) In primary cancer of the breast with palpable lymph nodes in the axilla, the results of surgical treatment have been less satisfactory than in Group No. 1. In

general, by surgical treatment alone the cures are estimated at from 20 to 25 per cent. It is my opinion that these values can be doubled by adding pre-operative and post-operative treatment. Unfortunately that still leaves a mortality of from 50 to 60 per cent.

In general, and for the present, I believe we had better treat these cases like Group No. 1. That is, we should give a course of pre-operative radiation and operate as soon as the constitutional effects have passed and then give a second course of radiation.

From experiences that I have had, I believe that after we have developed sufficiently our high voltage technic we shall treat these cases by radiation during at least two months. In some cases, then, all evidence of disease will have disappeared. If any remains, it will then be treated by insertion of radium needles locally, or it will be excised locally.

(3) Primary cancer of the breast with distant metastases, such as involvement of the mediastinum, pleura, lungs, bone, liver, etc., is, so far as cure is concerned, hopeless from any known method of treatment.

In some instances, the known local lesions can be made to disappear by radiation. Unfortunately, such lesions are usually only part of a general carcinomatosis. While such localized or known lesions are being treated the others are continuing to develop. If one is fortunate enough to get a case with the metastases localized to one or two lesions, he may succeed.

In a number of cases I have succeeded in causing lesions in the spine to heal, but the patients died of lesions elsewhere in the body.

For example, one woman had been operated upon by Dr. Deaver. There was no local recurrence, but in about six months she was bed-fast with metastasis of the spine and remained so fifteen weeks, when I examined her and found total destruction of the second lumbar and partial destruction of the eighth dorsal. She recovered, under radiation treatment, did her general housework for four years, and then died of disease of the liver, presumably carcinoma.

(4) The subject of recurrent carcinoma locally, with or without metastasis, has been dealt with by me in a previous paper and I have little to add. Suffice it to say, both the local recurrences and known metastases can usually be made to disappear, but in most instances there will be ultimate failure. I have patients, however, treated as long as 15 years ago for recurrences, who are still free from any known disease.

(5) In the treatment of distant metastases without local recurrences, we can hope for success only if they are strictly localized and not merely a part of a general carcinomatosis.

CONCLUSIONS

(1) Pre-operative radiation treatment is intended to devitalize the carcinoma cells and to render the soil unfavorable for implantation.

(2) Post-operative treatment is intended to destroy any unremoved carcinoma cells and to destroy any neighboring metastases.

(3) The combination of surgery and radiation will probably double the good results obtained by surgery alone.

(4) Inoperable cases can sometimes be made operable by radiation.

(5) As much care and skill are required for the application of radiation as for excision by surgery.

(6) The possession of an x-ray machine or of a quantity of radium is no more a guarantee of efficiency than is the possession of a set of surgical instruments a guarantee of surgical skill.

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THE TREATMENT OF ECLAMPSIA AND NEPHRITIS, COMPLICATING PREGNANCY*

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Despite the fact that Jurgens, Scmorl and Williams in recent times have demonstrated that the primary lesion of eclampsia is in the liver and that Bright in 1827, Rokitansky in 1842, and Virchow in 1852 showed the true pathology of nephritis, we are not saving as many cases of convulsions during pregnancy, labor and postpartum as we should.

There are three reasons why the mortality of convulsions in pregnant women remains so high: the first is that we do not know the underlying cause; the second that these women are desperately ill; and third, that we need more system and team work, to learn what the symptoms indicate, and willingness upon the part of the one who knows to devote a tremendous amount of time to the patient.

Our experience has been that unless a pre-eclamptic has convulsions, or becomes comatose she has about as good a chance for living as the normal pregnant woman. The moment she has convulsions or becomes comatose her chance is between one in four and one in five. Going "over the top" is a safe game in comparison with having a convulsion during pregnancy, labor or post-partum.

A very large number of pre-eclamptics can be saved from coma and convulsion by intelligent treatment. In a rather large obstetrical experience extending over many years but two of my pre-eclamptics have gone to convulsions. One of those had no pathological urinary findings or change in blood pressure twenty-four hours before she had convulsions.

The record of our Dispensary is almost as good. The history of the convulsive cases in the clinic is almost invariably that they have not seen a doctor and that they have not attended the Dispensary.

We claim no particular skill in preventing convulsions in our private and Dispensary cases. When a woman presents symptoms, has a rising blood pressure or has albumin or casts in her urine, we take the case seriously and at once begin treatment.

I am inclined to believe that the women in this section are particularly prone to have convulsions during pregnancy. In a series of clinical obstetrical cases published in 1920, I found 2.2 per cent of convulsions in 2341. The only place with a greater per cent was 2.68 per cent in 14,836 cases reported from Leipsig by Lichtenstein in 1911. The smallest number was .34 per cent in 26,511 reported by Reinburg, of Paris.

Dr. J. Allison Hodges has shown by life insurance statistics that Virginia is in a high blood pressure zone. This may have some bearing upon the great number of convulsions in this section.

With the first sign of malaise, headache, edema, blurred vision, vomiting late in pregnancy, rising blood pressure, albumin or casts in the urine the case is carefully examined to find the underlying cause. We assume that the case has pre-eclampsia or nephritis unless we can prove that some other pathology produces the symptoms.

The diet of this case is restricted to milk and bread and she is put upon cream of tartar lemonade, a drachm of cream of tartar to the pint, and digitalis in some form.

If her condition does not promptly improve she is put to bed, preferably in the hospital, a blood chemical analysis is done and at the time the blood is withdrawn for this, 200 cubic centimeters or more of 20 per cent glucose solution are run into her vein. If the blood pressure has been rising and is in the neighborhood of 180/100, I withdraw 150 or 200 cubic centimeters of blood before giving the glucose. The digitalis is continued to its physiological result and her diet is reduced to cream of tartar

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lemonade. If she is very edematous she is sweated by hot packs or the electric blanket. If she does not improve labor is induced. The labor is guarded with a sufficient amount of morphin to make her comfortable. Her delivery is protected with gas-oxygen anesthesia. I try not to give morphin within two hours of delivery, because of the baby.

My attention was called to the use of large doses of glucose intravenously by an article by Paul Titus, M. H. Givens and George L. Hoffman (*J. A. M. A.*, 78: No. 2, 1920). The argument advanced by them that the degeneration in the liver was possibly due to a carbohydrate deficiency seemed reasonable to me. Slemons has already shown that the carbohydrates in mothers' blood are used by the baby in making carbohydrates and probably for the making of fats. This added call upon the carbohydrates of the mother would of necessity reduce them more rapidly than in the non-pregnant woman.

The baby is a parasite, growing as all parasites do at the expense of the host, and if the mother is not able to replace her carbohydrates with ease and rapidity, her tissues will soon suffer.

In our series, the average of blood sugar before injection was 84.83 milligrams per 100 cubic centimeters. The highest was 130 and the lowest 29. In the latter case the woman was suffering in addition to her convulsion with acute dementia. After injection the average blood sugar was 98.25, with the highest 140 and the lowest 75.

While I did not find a low blood sugar in all of the cases I felt justified in adding intravenous glucose injections to the Dublin method that was being used. The fact that the addition of intravenous glucose and digitalis therapy has reduced the mortality from 30 to 19 per cent seems to justify its continuance.

The plan of treatment of convulsion is the same whether the case is one of eclampsia or of nephritis. If the patient continues to have albumin and casts in her urine and has marked demonstrable retina changes, she is a nephritic. One object in the treatment of the convulsions is to keep her alive long enough to be able to make a differential diagnosis.

The system that we have found most effective for the treatment of convulsions may be summarized as follows:

(1) Give morphin sulphate gr. ½ by hypodermic. This is usually done by the ambulance surgeon. If a hypodermic has been given on the outside and we cannot find out what it was, then we give only ¼ for fear that we will over morphinize the patient.

(2) Morphin is repeated if she continues to have convulsions, giving smaller doses until her respirations are ten.

(3) She is put into a room by herself and watched continuously.

(4) Wash out her stomach and leave a swift purgative. I prefer Epsom salts, 2 ounces with a drachm of tincture of digitalis. I do not wash the stomach if the patient is conscious and very rebellious for fear of precipitating an attack. In this event the digitalis is given by hypodermic in the form of digifolin or digitalin 1/10 grain.

(5) Digitalis in some form is used until the patient is digitalized.

(6) In the event of a convulsion the nurse is to seize the patient by the hair and hold her head over the side of the bed so that she will not choke during the convulsion and will not insufflate any of the mucus, food, etc., that may be in her mouth. The nurse also puts a mouth gag into her mouth to keep her from biting her tongue.

(7) She uses artificial respiration and oxygen after the attack if necessary.

(8) A high colonic irrigation is given, first with soap suds, then after the feces are all washed out with 5 per cent glucose solution. This is repeated every eight hours.

(9) Withdraw 200 cubic centimeters or more of blood, depending upon the blood pressure. Have a complete blood chemical analysis made, not forgetting sugar. Through the same needle 200 to 300 cubic centimeters of 20 per cent sterile glucose solution freshly made are injected.

(10) If the patient is doing badly, if the convulsions are increasing in number and severity with coma between the convulsions, if the lungs are becoming more and

more edematous, deliver in the way that will cause the least shock to the mother.

(11) After she has recovered sufficiently to swallow, give cream of tartar lemonade, one drachm to the pint, as much as she will take.

(12) Do not give any food until the patient has begged for it. The first nourishment is sweet milk. Very frequently these cases go for three or four days without anything except water or cream of tartar lemonade.

CASES TREATED WITH LARGE DOSES OF GLUCOSE, MORPHIN, DIGITALIS

	No.	Moribund	Died	Babies Died
Pre-eclampsia	9	0	0	0
Nephritis	8	1	1 (12.5%)	3 (37.5%)
Eclampsia	22	4	6 (27.2%)	8 (36.3%)
Post-delivery eclampsia	3	0	1 (33.3%)	1 (33.3%)
	42	5 (12.8%)	8 (19%)	12 (26.6%)

There were three pair of twins.

Death rate of those having convulsions, 24.2%.

OPERATIONS

	No.	Voorhees Bag	Bag and Version	Forceps	Ces. Sect.
Pre-eclampsia	9	0	2	1	1
Nephritis	8	3	2	1	0
Eclampsia	22	2	5	4	2
Post-delivery eclampsia	3	0	0	0	0

CESAREAN SECTIONS

The pre-eclamptic was a primipara with central placenta previa. One eclamptic was moribund, operated under local to save baby. One eclamptic was a primipara with twins, not in labor and doing badly. All were saved.

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DISCUSSION

Dr. M. P. Rucker, Richmond, Va.—Dr. Baughman has said very little about the etiology of eclampsia. As a matter of fact, we know very little about it. The only thing we are certain of is that it is a disease associated with the pregnant state. A large proportion of cases have some degree of degeneration of the convoluted tubules of the kidney. Up to about 1886 we thought that this was the cause of the disease. Almost all the cases have focal necroses in the liver, usually in the periphery of the lobules. This has been shown by Flexner to be due to a blocking of the capillaries by agglutinated red blood cells, which lends some color to the latest work by McQuarrie and Gruhzit. These authors think that the incompatibility of the baby's blood and the mother's blood have something to do with the causation of eclampsia. The agglutinins could cause such a condition, but the hemolysins which are formed about the same time would dissolve the thrombi. It is quite possible that the liver lesion may share the same fate that the kidney lesion did and come to be looked upon as a result rather than a cause.

The great majority of the writers on this subject now regard eclampsia as a toxemia of some form, but there is no accord as to where in the body of the pregnant woman the toxin is formed. In this connection the recent work on tetany of Luckhardt and Courtney furnishes a useful analogy. I do not wish to infer that the parathyroids have anything to do with eclampsia. When the parathyroids are carefully removed from dogs, they accumulate enough guanidin, or methyl guanidin, in three or four days to cause characteristic tetany. These dogs can be saved in two ways: either by lessening the irritability of the central nervous system by calcium therapy, or by diminishing the toxins by changing the intestinal flora. Dr. Courtney tells me that if the dog be pregnant it cannot be saved by any method.

In like manner in our eclamptics we can diminish the irritability of the nervous system with morphin and lessen the amount of toxin, whatever it may be, by elimination.

The work of Opie and Alford in St. Louis, and Whipple and his co-workers in California, shows that after chloroform and phosphorus poisoning the liver has a greater detoxicating power and regenerates faster if carbohydrates be available. Titus has applied this clinically in eclamptics and it seems to work.

I wish to emphasize what Dr. Baughman has said about digitalis. Most of the immediate mortality is due to heart failure with edema of the lungs, and digitalis is important in safeguarding these patients against such a catastrophe.

I think it ought to be explained in connection with Dr. Baughman's statistics that St. Philip's Hospital is a place of last resort in these cases.

I remember two of his fatal cases. They were brought into the Hospital within a few days of each other. Their lungs were filled with fluid and their temperatures were above 105 degrees on admission. They died in four or five hours.

Dr. Buford G. Hamilton, Kansas City, Mo.—I was interested in Dr. Baughman's suggestion that Richmond seemed to be in an eclamptic area. Kansas City must be in such an area since personally I have seen over 100 cases in convulsions in the last five years and am seldom without a toxic case under my care. An interesting point in my series of cases is that the majority of them have been from the country, or general hospital cases that either have had no previous treatment or in whom the seriousness of the condition had not been appreciated.

We agree thoroughly with Dr. Baughman in the general management of those cases in convulsion, but must differ in the use of morphin, and especially digitalis. However, our difference of opinion may be due to the fact that we have not followed such a line of treatment.

In many of the cases that we have had a chance to follow up there have been heart lesions, especially mitral regurgitation, that was not present before. In most cases there is a full, bounding pulse, and a heart force greater than before. If we understand the physiological effects of digitalis, it is to slow and increase the force of the heart beat. Without doubt there is a toxic myocarditis in many of these cases and this would seem to be a contraindication for the use of digitalis.

It has been our custom to depend upon veratone to control the convulsions until delivery is possible. At the present time I have two cases in the hospital that were brought in unconscious in convulsions. The usual routine, between blanket sweating and magnesium sulphate, was started and 10 minims veratone intramuscularly were given. In both cases a decided drop in the pulse and blood pressure was seen and both patients became conscious. When it was seen that the convulsions could be controlled, a No. 4 Voorhees bag was introduced. Veratone in 5 minim doses was given when the pulse rate and blood pressure increased. No more convulsions were seen. Consciousness was complete and delivery uneventful. Morphin in grains 1/8 to 1/6 seems to aid many of these cases, but if given in larger doses with veratone it lengthens labor. This is characteristic of a large series of my cases. If a patient will not respond to veratone and the usual routine we feel that a cesarean section, abdominal beyond 6½ months and vaginal below this period, is indicated. It must also be emphasized that eclamptic patients are poor surgical risks and that medical treatment should be thoroughly tried before surgical treatment is attempted. In a few cases especially with low blood pressure spinal puncture may tide the patient over until delivery is possible. After-care must always be rigid. Intake, output, urine and blood pressure and the response of the patient are our guide.

Dr. Baughman brings out a point that cannot be made too emphatic. The physician should be on the job when a case is in convulsion. As he has said, many lives are saved by doing the right thing at the right time. The second point is that eclampsia most often can be prevented and if appreciated early, few cases will have convulsions.

Dr. W. J. Judy, Belleville, W. Va.—I must agree with Dr. Hamilton in the use of digitalis. I use veratone to get the pressure down, but the essential thing in these cases is elimination, and especially elimination through the skin. I begin with hot packs immediately in these cases, and when one pack is cool I put another on, and in that way help to eliminate the toxins more rapidly than by any other way.

Another useful thing in my hands has been croton oil. I give two minims in sweet oil and get results more quickly with that than any other purgative.

I believe my fetal mortality has been greater than the Doctor's. My maternal mortality has been 33 1/3 per cent.

Dr. T. S. Field, Jacksonville, Fla.—Blood pressure in any disease, whether eclampsia, arteriosclerosis or something else, is a reaction to the individual disease. We have high blood pressure far as treatment is concerned has varied very little. I remember hearing Dr. Zinke, of Cincinnati, give his resume of thirty-five years of expebecause it requires high blood pressure to force the urine through the kidney or to accomplish whatever end is desired. The thing to do is to get rid of the toxemia. You cannot reduce it by reducing the blood pressure. You must get the toxemia out of the system by elimination. The best elimination is by the bowels and the best way is by high colon irrigation. You can then introduce glucose and soda bicarbonate to combat acidosis.

Dr. G. V. Morton, Fort Worth, Tex.—For the past twenty years the question of eclampsia as rience, and that dated back twenty years beyond my time.

Interference in eclampsia means the emptying of the uterus and delivering the woman as soon as possible and the method of delivery depends upon the conditions found in the individual case. In most cases we do either a cesarean or a version. The patient must be put in as good physical condition as possible and then the uterus must be emptied.

In our private practice we have a very small percentage of these cases compared with the cases that are brought into the hospital from the outside. The very low percentage of eclampsia or toxemia symptoms in those cases that are given prenatal care, and the very high percentage of eclampsia or toxemia symptoms in those cases that are brought from the outside, shows that the thing we must pay attention to more than anything else is along the line on which medicine is now advancing, and that is the preventive treatment. That means the men who are doing obstetrics, where they are watching their cases and seeing them often, are preventing the things that lead to such trouble.

There is another point about eclampsia. We are liable to overlook the fact that the patient may become pregnant again, and that brings up the question of the effect of the toxemia of eclampsia on her kidneys as a permanent injury. For that reason I have been doing a kidney functional test on these women. After the woman has gotten well of her first pregnancy I do a phenolsulphonephthalein functional kidney test and see how it compares with the normal, and I have found that it guides me as to what I should advise and expect should my patient become pregnant again.

Dr. N. P. Boddie, Durham, N. C.—I have never seen a case of eclampsia continue after the patient has received veratone, Norwood's tincture 15 or 20 minims hypodermically, repeated every hour until results are obtained, reducing the pulse to 50 or 60. Chloroform is given at the same time to control convulsions. As a preliminary, when you see the case becoming septic before eclampsia comes on, a good thing is bicarbonate of soda and salts freely.

These are very simple things, but I feel we ought to know something about them. They are so accessible and prompt in their action.

Dr. L. A. Yarborough, Covington, Tenn.—In a bad case of eclampsia you must do something before morphin takes effect. There is nothing better or less dangerous than chloroform to relieve the convulsion, control the patient and keep her from choking to death later on. Of course you have to reduce the blood pressure, but you must act and act quickly. You had better be careful how you use veratone and not give too much. I think every doctor should have in his armamentarium a can of oxygen and also some whiskey. Cases of weak heart who receive veratone will die. Digitalis is what you need in those cases, but if the heart jumps up to about 120, after you give the patient a whiff of chloroform it is a good idea to give her veratone instead of bleeding her. Of course if you have hemorrhage to reduce the blood pressure it will have the same effect, but when you give veratone you reduce the pressure and relieve these symptoms.

Dr. Baughman (closing).—The pathological changes in the liver following chloroform poisoning and eclampsia are almost identical. For that reason chloroform has no place in the treatment of eclampsia.

I believe what Dr. Field has just said is correct. Blood pressure is a symptom and not a cause. Blood pressure goes up because of the presence in increasing amount of the toxic material. The toxic material and not the blood pressure causes the convulsions. We find not infrequently convulsions with low blood pressure and high blood pressure without convulsions.

While bowing to the judgment of the late Dr. E. Gustav Zinke and others who have advocated the use of veratone to reduce blood pressure, thus preventing convulsions, I have not tried veratone for the reasons stated above.

Our plan for the treatment of eclampsia will be improved by a corps of trained nurses, who are having intensive instruction in the care of these cases. As soon as a case enters the hospital she will be specialed by these instructed senior nurses. We believe that the constant presence of some one trained in this work will improve our mortality.

Constant vigilance is probably the best treatment of eclampsia.

EYE, EAR, NOSE AND THROAT

SIXTH NERVE PARALYSIS IN ACUTE OTITIS MEDIA AND ITS COMPLICATIONS*

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It certainly is not generally appreciated that the sixth cranial nerve can be isolatedly involved in suppurative inflammations of the middle ear, mastoid cells and the temporosphenoidal lobe. The current text books are surprisingly silent on so important a subject. The comparative rarity of such an association, namely, a single nerve paralysis, in these conditions may explain this neglect on the part of text book writers. And yet, Gradenigo,[1] in 1907, tabulated fifty-seven cases, from various sources, including his own cases, presenting his now classic syndrome, and John Wheeler[2] collected sixteen cases reported in the literature. The Gradenigo cases are characterized by a triad of symptoms: (a) an acute otitis media, with or without a mastoiditis, (b) a paralysis of the sixth cranial nerve on the same side as the otitis, (c) intense pain along the trifacial nerve distribution of the same side. The following case reported by Wheeler[2] illustrates the Gradenigo syndrome.

M. W. S., aged 11, a thin and rapidly growing girl, called at my office June 9, 1917. Two years before she had been a victim of mastoiditis on the left side and the mastoid was successfully operated upon by Dr. John D. Richards. For the preceding six weeks she had had a running ear on the right side and was being treated conservatively by Dr. Philip D. Kerrison. The child was brought to me on account of double vision, which she overcame by closing the right eye, and very severe pain in the right side of the head, which was most intense over the right eye. Examination revealed complete paralysis of the right external rectus. Gradenigo's syndrome was clearly exemplified and the condition was reported to Dr. Kerrison, who thought best to perform the mastoid operation. Two days after the patient visited me the mastoid was cleaned out and it was found to be of the pneumatic type. But nothing unusual was found in spite of careful search for a lead to the sixth cranial nerve. The next day after operation there was decided improvement in the diplopia, and on the third day the diplopia and the pain had entirely disappeared, not to return again. I saw this patient last December 8, 1917, and at that time the muscles were in balance and the tropometer showed normal rotations.

ANATOMICAL CONSIDERATIONS

The sixth cranial nerve emerges from the brain proper between the pons varolii and the medulla, and passes forward and upward in contact with the dura mater covering the basilar surface of the sphenoid. This portion of the nerve is approximately one inch long. The nerve then penetrates the dura and rests in a groove which lies well below the posterior clinoid process and on the side of the dorsum sellae. From this groove it passes under the petrosphenoidal ligament, then forward within and through the whole length of the cavernous sinus on its extreme outer side. It leaves the sinus to course through the sphenoid fissure on its nasal side and enters the orbit to innervate the external rectus muscle of the eyeball. The anatomical arrangement of supreme importance in this presentation of the subject is the relation and position of the sixth nerve just as it passes under the petrosphenoidal ligament and also as it emerges from under this ligament. This is a point of contact which exposes the nerve to pressure or strangulation by adjacent pathologic changes. In this region the bony parts, fibrous and fascial tissue, are some of the essential structures which unite in forming an osteofibrous canal (Dorello's canal) through which the sixth nerve passes. My own dissections show what is not emphasized in treatises on anatomy, namely, that this nerve is absolutely isolated from other ocular nerves in

*Read in Section on Eye, Ear, Nose and Throat, Southern Medical Association, Seventeenth Annual Meeting, Washington, D. C., Nov. 12-15, 1923.

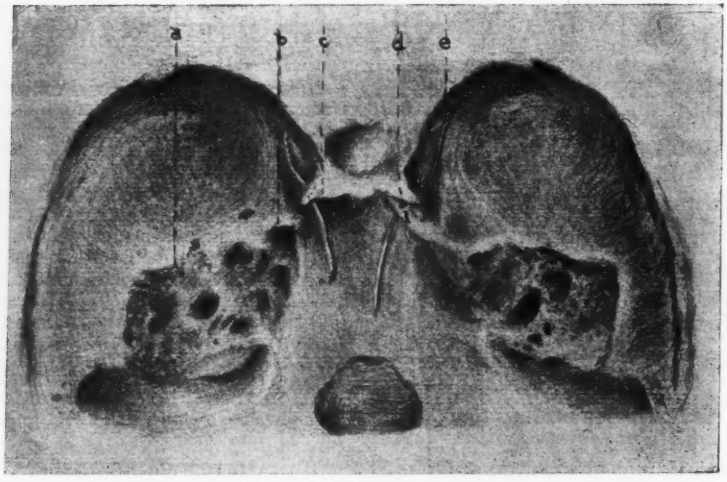

Fig. 1.—Dissection by Dr. Homer Dupuy, Charity Hospital Laboratory. (a) Pneumatic cells in petrous bone. (b) Apical cell of petrous. (c) Petrosphenoidal ligament removed, showing sixth nerve passing below post. Clinoid process. (d) Sixth nerve passing beneath petrosphenoidal ligament and coursing in Dorello's canal. (e) Sixth nerve's external position within cavernous sinus.

this osteofibrous space. The nerve actually lies between two small spicules of bone, the one projecting from the tip of the petrous bone and the other from the dorsum sellae. The petrosphenoidal ligament, under which the nerve passes isolatedly, is made up of tough fibrous tissue extending from the tip of the petrous bone to a point slightly below the posterior clinoid process of the sphenoid. The unyielding space thus formed becomes the vulnerable point at which the sixth nerve can be readily and isolatedly compressed. Any inflammatory swelling in the region of the tip of the petrous bone can bring this about. There is an anatomically prepared way for the extension of a pathogenic process from the middle ear or mastoid to the petrou tip. This preformed route is through the pneumatic structure within the petrous bone itself. The rock-like (petrous) character of the petrous bone is not infrequently lacking. In fact the pneumatization of the whole temporal bone, including the petrous division, varies greatly in different individuals. In some instances from base to apex it is a highly pneumatic structure. Such a large cellular arrangement permits an all-way invasion from the middle ear or mastoid regions. Dehiscences in the dividing walls may further facilitate an extension. With a distinct cell in the petrous tip, directly over the notch covering the sixth nerve, we have a completion of the mechanism by which infection can reach this vulnerable position of the sixth nerve. Relative to the pain transmission

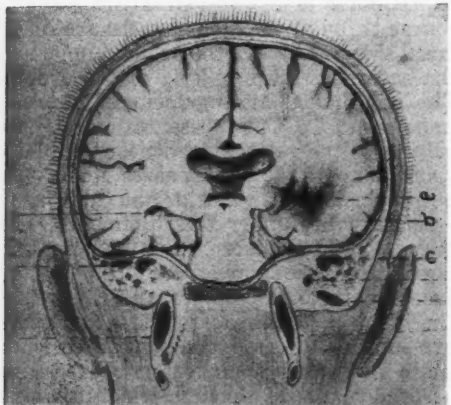

Fig. 2.—(a) Visualizes Dupuy's recorded deep temporosphenoidal lobe abscess. Its situation, near apex of petrous bone, explains compression of sixth nerve. (b) Normal cortical tissue. (c) Mastoid cells.

along the trifacial branches this can be readily accounted for by the close proximity of the gasserian ganglion to these petrous apex cells. Any inflammatory exudate in that region will of necessity disturb the ganglion.

But there is another type of sixth nerve involvement originating from a different pathogenetic cause which is not sufficiently stressed by Gradenigo. It is of course a sequel of infection either in the ear or mastoid, but differs from the Gradenigo type in as much as it is not transmitted along the same anatomical pathway. The following case is a well-defined example of this second type:

S. C., a white boy, 12 years old, on June 12, 1921, had an attack of acute otitis media, which ruptured one week later and was followed by profuse otorrhea. Dr. Louis Levy saw him July 9, 1923. The patient presented marked postural swelling and had a temperature of 104°. The urine showed pus, red blood cells and hyaline and granular casts, indicating pyelonephritis. The patient was referred to Dr. Homer Dupuy, who corroborated the diagnosis of mastoiditis. On July 9 mastoidectomy was done with the following findings: (1) pus in the antrum and cells; (2) the sigmoid sinus plate was destroyed; (3) a large temporal abscess was incised and drained. He ran a septic temperature for about eight days following the operation. During this period he had attacks of nausea and vomiting with intense headaches, which were attributed to the kidney condition. The headaches disappeared, the urine was normal and the middle ear and mastoid were apparently healed. On July 25, two days after his discharge, he was re-admitted to the hospital with intense hemicrania, droopiness, nausea and vomiting. His temperature was 98.6°, pulse 64, and the nausea and vomiting continued. The urine showed a return of hyaline and granular casts, pus and occasional red blood cells. The blood picture was as follows: total white blood cells, 13,650, neutrophiles 85 per cent, small mononuclears 12 per cent, and large mononuclears 3 per cent. July 27 he was semicomatose and had slight convulsive movements. His pulse continued slow. The examination of his eye grounds by Dr. Jules Dupuy showed normal fundi. To rule out the possibility of uremia, a blood chemical analysis by Dr. Maurice Court gave this report: "All blood constituents are normal except for a slight increase in uric acid." During the afternoon of July 27 the patient grew steadily worse. He had tonic convulsions and his pulse was 50. The right pupil was alternately fixed and dilated and he had right convergent strabismus. A craniotomy the same afternoon exposed the brain over the tegmen antri and tympani. The dura over the whole temporosphenoidal lobe appeared healthy with not the slightest sign of a 'stalk.' A crucial incision of the dura showed a normal-looking cortical surface. An incision about one and a half inches deep, in the direction of the apex of the petrous bone, inward and anteriorly, brought forth a gush of foul pus with an excessive amount of hemorrhage. About two and one-half ounces of pus were evacuated from the abscess cavity. The intracerebral hemorrhage seemed almost uncontrollable, so the cavity was packed with a strip of plain gauze and the wound temporarily sutured. The loss of blood called for an infusion of 500 cubic centimeters of saline. The patient regained consciousness before leaving the operating room. The next morning his mental state was excellent and the pulse oscillated between 52 and 80. It gradually became more normal and about ten days after operation it was not beating below 70. The packs were removed on the second day and no bleeding from the abscess cavity followed. No drain was reinserted in the abscess cavity. For several days following operation the wound in the brain was gently pried open with dull edged forceps. The infection was of staphylococcic origin.

(1) The hemicrania, vomiting, urine picture, coma and slow pulse argued either kidney or intracranial trouble. The blood chemical analysis proved invaluable in excluding the kidney.

(2) There must have been a cerebral suppuration at the time of the mastoidectomy which did not express itself by definite interpretable symptoms.

(3) The right convergent strabismus in itself suggested a deep seated abscess with pressure phenomena in the region of the petrous apex. The vulnerable position of the sixth nerve in that area explains its involvement. Three weeks after the craniotomy the paralysis had disappeared.

(4) Analysis of this case record supports my contention that when surgery has thoroughly removed purulent collections from the middle ear and mastoid, among other signs present and pointing to endocranial abscess, the sixth nerve involvement has unquestionably a localizing value. Whatever light the other symptoms may throw on the localization of the abscess, a sixth nerve paralysis on the same side as the suspected lesion is in itself reliable evidence that we are in the presence of deep seated suppuration. It argues that there is compression near the petrous apex. It should embolden the surgeon to explore deeply, if need be, to find the abscess. It, moreover, assists in the differential diagnosis between a cerebral and cerebellar abscess. Certainly, the

sixth nerve is never isolatedly encroached upon in cerebellar suppurations.

(5) A normal looking cortex and the absence of a "stalk" added to our difficulties in locating an abscess in such delicate tissue as is present in the brain substance. This case demonstrates that even then all is not hopeless.

PROGNOSIS AND TREATMENT

Rapid recovery of the nerve function is recorded in some of the cases. In other instances the complete disappearance of the paralysis required several months. It would seem that an early diagnosis with the institution of proper and thorough surgical treatment would insure and hasten a favorable result. This ultimate restoration of the nerve function can be looked for in the Gradenigo type. When the paralysis is associated with an intracerebral abscess the successful evacuation of the latter should restore the nerve function. My reported case supports this statement.

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DISCUSSION

Dr. Oscar Wilkinson, Washington, D. C.—I have seen two cases of this condition, both following mastoid infections and operations. The first case was that of a woman thirty years of age who developed sixth nerve paralysis and facial neuralgia on the fifth day after a mastoidectomy. This case went on to recovery without further surgical treatment. The second case, which disproves to a certain extent one of Dr. Dupuy's contentions, i. e., that "the sixth nerve is never encroached upon in cerebellar suppurations" was as follows:

A young man about thirty came to see me four years ago on account of severe neuralgic pain about the left eye and temple. He gave a history of acute otitis media, followed by mastoiditis, for which he had been operated upon six weeks previously. Soon after he developed marked dizziness, severe headaches, followed by loss of hearing in the ear, paralysis of the sixth, eighth and ninth nerves, with irritation of the fifth, as was shown by the neuralgic pain of the face, of which he complained bitterly. After consultation with a neurologist it was decided he had a cerebellar abscess. Dr. C. W. White did a cerebellar decompression and two days later I explored the cerebellar hemisphere. At the region of the internal auditory meatus an abscess was found. This was drained and after a stormy period of three weeks he recovered.

The involvement of the sixth nerve in this case was no doubt due to the extension of the inflammation over the petrous portion of the temporal bone.

I concur entirely with Dr. Dupuy's preachment that the Gradenigo syndrome is an indication of a deep-seated lesion, and where other diagnostic aids point to an abscess in that region it is our duty to explore it fearlessly, despite the fact that it is a most delicate surgical procedure.

Dr. C. A. Weiss, Baton Rouge, La.—Dr. Dupuy's title seems to confine the etiology entirely to suppuration of the middle ear. However, if we are given a case of ophthalmoplegia externa, internal strabismus, monocular diplopia and secondary deviation of the eye, the question arises, what is the cause of the symptom complex? If these phenomena are produced by fixation of the externus rectus muscle, we naturally trace the nerve supply of this muscle in order to localize the cause of the paralysis, back to where the nerve passes under the temporosphenoidal ligament to its origin in the brain. Dr. Dupuy stated that in syphilis, due to the fact that this nerve is exposed in the cavernous sinus, it may be more readily subjected to general systemic toxins. I imagine we could just as easily consider the pathological changes in the osteofibrous canal affected by syphilis as being the cause of the affection of the sixth nerve due to pressure upon the nerve in passing under this particular ligament. In ophthalmoplegia, whether external or internal, the usual order of listing is, choked disc, fixation of the ocular motor, and then the abducens. The literature is rather sparse on the subject of sixth nerve paralysis.

Of course we must consider the source, the origin of the sixth nerve, and then its course through the cranial cavity into the orbit. I think the very fact that the sixth nerve is involved in lesions of the middle ear, which naturally must go to the extreme end of this process and affect the nerve by pressure, indicates that the cerebellar lesion must be extensive and produce sufficient pressure to cause paralysis. We know that paralysis may be due to pressure caused by traumatism and other pathological conditions, but in connection with middle ear suppuration it naturally brings to our mind a picture of a deep source of suppuration sufficient to cause pressure upon this nerve.

Dr. E. G. Gill, Roanoke, Va.—It has not been my privilege to have a case of this type, and consequently my knowledge of the subject has been obtained from the literature and from contact with other men doing the work. In 1918, Dr. Wheeler, of New York, gave a very beautiful and classical description of this condition before the Section on Ophthalmology of the American Medical Association, and I refer to his paper because of the fact that some of the cases he reported are not exactly typical of this condition. In one case he reported a furunculosis of the external auditory canal producing paralysis, without any involvement of the middle ear. He also reported another case of involvement of the ear on the left side with a double abducens paralysis. Both

conditions cleared up after mastoid operation. He also reported a case of abducens paralysis with middle ear involvement, in which there was no operation done, and the paralysis cleared up following treatment of the middle ear.

It seems to me, in considering the etiology of this condition, that there are three distinct avenues of infection: one, as Dr. Dupuy so beautifully demonstrated, by direct continuity; second, the hematogenous route; and third, the lymphatic route. I would like to have him say what he thinks of this condition's occurring through the last route.

Dr. Dupuy mentioned one case, the patient who had a kidney involvement at the same time as his ear infection. I think his management of this case is worthy of emulation by all of us. We who do otolaryngology should regard ourselves as general practitioners doing otolaryngology instead of ear, nose and throat specialists. If we have abducens paralysis and mastoid involvement we should not stop with the ear. We should investigate every possible cause.

Dr. Dunbar Roy, Atlanta, Ga.—There is a good deal of obscurity about the etiology of this condition. In any condition at the base of the brain one of the first symptoms is sixth nerve paralysis. If we have tumor of the brain, the pressure will frequently bring about a condition of sixth nerve paralysis, and those of us who do eye work are frequently surprised at the number of cases that come to us where the sixth nerve is involved, showing what Dr. Dupuy has brought out—that it is a vulnerable nerve at the base of the brain.

I reported a case of sixth nerve paralysis on the side opposite the middle ear suppuration, following mastoid operation. In these cases you have not only involvement of the sixth nerve with suppuration of the middle ear following mastoid operation, but you also have sixth nerve paralysis coming on after mastoid operation. This whole subject has been gone into exhaustively by Dr. Perkins, of New York City. He has done a lot of work, and in fact every one of us has followed the lines he has laid down.

The cause of this condition is very obscure. Why you should have a suppuration and mastoid operation on one side and sixth nerve involvement on the other I do not know. There must be a certain amount of vascularity, but why it should jump across it is difficult to say. Personally, I believe the condition is due to either hematogenous or lymphatic involvement of the toxins, and you have a low grade neuritis. In my own case the sixth nerve involvement came on about eight days after the mastoid operation. The boy was out in a week's time and this came on suddenly on the opposite side. I gave him nothing but iodid of potassium and in three weeks it had entirely disappeared.

There is another feature about these sixth nerve paralysis cases, and that is that they nearly always get well. It is not a serious condition, showing that it may be a neuritis which is relieved after the system is free of toxins. It may be due to a certain amount of exudate and pressure, as Dr. Dupuy says.

In my work I think paralysis of the sixth nerve occurs in about two-thirds of the cases of nerve paralysis. The toxic condition occurs sometimes at the base of the brain, and even pressure inside the brain will produce enough pressure to cause a temporary paralysis of the sixth nerve. The etiology may be one of several things.

Dr. J. A. Stucky, Lexington, Ky.—I wish the essayist in closing would tell us the indications for doing an exploratory operation. I have seen one or two cases where paralysis was due to what we thought was an intracranial condition. Subsequently it proved to be something else.

Dr. R. W. Bledsoe, Covington, Ky.—This is one of the rare conditions. It is not one that will be seen as frequently as the ordinary sixth nerve paralysis.

Dr. Dupuy (closing).—Dr. Wilkinson read a copy of my paper, and if he remembers, I distinctly stated that the subject matter was the involvement of the sixth nerve alone, isolatedly. If the sixth nerve alone is involved, then cerebellar abscess is not to be thought of. If you have the third, fourth and sixth nerves involved at the same time, of course you may have a cerebellar abscess.

Dr. Wilkinson brings up the question of toxicity or pressure. Of course in cases when the middle ear is involved, I believe both are possible, or either alone. I am laying stress on the compression picture. I agree with Dr. Weiss, Dr. Gill and Dr. Roy that the circulation of the lymphatics may carry the infection from the mastoid or middle ear to that vulnerable area of the sixth nerve and involve it, not by compression, but by toxic phenomena.

Dr. Gill recites a case in which no surgery was applied. There are cases on record in which the middle ear was not opened by the surgeon and the patient recovered. We must compliment Nature, that is all. We cannot question her recuperative powers. That brings up the question of prognosis, which is very favorable as to recovery of the nerve. In all the cases recorded by Gradenigo, Perkins and Wheeler, there was complete restoration of the sixth nerve. That, of course, applies only to the Gradenigo symptoms. The question of the recovery of the sixth nerve should hinge upon the cerebral abscess. If it is successfully drained the sixth nerve will recover.

I was puzzled when I came across Dunbar Roy's experience, and Eagleton's, in which the abscess was on the opposite side to the nerve involvement. If you look at my picture you can understand there may be some anatomical variation of the parts. There is a great chance for variation in the topography, length and relationship of the intracranial nerves; but I think we will have to reserve the complete solution of that question to some future time. I shall do my best to throw further light on cases in which the nerve is paralyzed on the opposite side from the mastoid or middle ear trouble. But when you remember the structure of the petrous bone, and the minute pneumatic cells around the mastoid antrum, it is absolutely demonstrable that infection can travel

from the mastoid cells, and by continuity of parts to the apical cells of the petrous, thus involving by compression the sixth nerve.

Dr. Stucky asks for surgical indications when we have sixth nerve involvement. If the picture is that of acute otitis media without mastoiditis and you wish a full restoration, I would say by all means open the drum membrane. That would insure more rapid recovery of this nerve. If you have mastoiditis *per se*, that calls for operation. There is no indication for intracranial surgery, unless you have the symptomatology of intracranial suppuration.

These cases are not an every-day occurrence. I have tried to present this subject from a new angle and to throw light on a few obscure points. The chief value of the contribution is that I am showing you a picture that the text books on anatomy do not give. All of the text books give the sixth nerve surrounded by other nerve structures. It is very difficult to get a clear idea of its exact situation. I have tried to show you the exact relations of the nerve to the petrous bone and to emphasize the possibility of the sixth nerve being involved in middle ear, mastoid and cerebral suppuration.

A THESIS ON THE ETIOLOGY OF GLAUCOMA, AND A NEW OPERATION (LANTERN SLIDES)*

By J. W. JERVEY, M.D.,
Greenville, S. C.

In brief explanation of my title, let me remind you that the word "thesis" is defined by the Century dictionary as, first: "the formulation in advance of a proposition to be proved," and again as: "a premise assumed and not proved, although not self-evident."

As to the etiology of glaucoma I have nothing new to offer you, but with your permission I shall sift and summarize the modern views which, in my experience, are most logical, always remembering that, in the words of Henry Elliott (one of the most conscientious and thoughtful students of the subject that has ever lived):

"The only scientific position to take up is that of open-minded agnosticism. The time is not yet ripe for dogmatic assertion." And again: "No one who has studied the *congeries* of conditions which we classify under the term 'glaucoma' can fail to be convinced of the depth of our ignorance on the subject we are discussing."

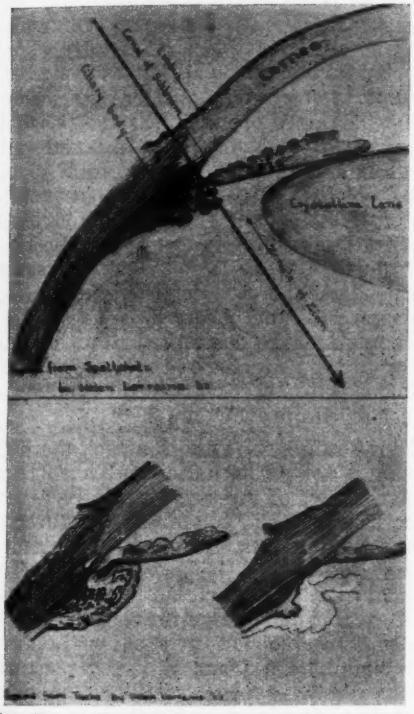
In an article evidencing deep thought and careful reflection, John Dunn (*American Journal of Ophthalmology*, May, 1922) opens with this statement: "Simple glaucoma is an ocular state which results from swelling of the vitreous body." Twelve or fifteen years ago Martin Fischer offered a similar explanation of the disease. In 1911, Treacher Collins and Stephen Mayou noted that a shallowing of the anterior chamber frequently precedes the onset of the increase of tension, and observed that it would seem probable that it is caused by an abnormal accumulation of fluid in the vitreous body, the swelling of which forces forward the lens and iris. Priestly Smith, Fuchs, Weeks, Elliott, Parsons and many other brilliant moderns, by inference, if not by actual statement, lend great weight to this hypothesis; and Bowman and von Graefe, fifty and seventy-five years ago, seemed fairly convinced of its correctness.

But whether as a cause or an accompaniment, vitreous enlargement stands today as an at least tentatively accepted fact in typical glaucoma, and many operations, with as many failures, have been devised to relieve the pressure behind the intraocular diaphragm. Dunn emphasized the occurrence of liquefaction of the vitreous in these pressure cases, but what makes this even more interesting is the result of the recent studies of Park Lewis on the subject of the histological structure of the vitreous. He showed that it is normally composed in part of watery fluid (vitreous aqueous) between its fine interstices, and that these water-filled spaces or containers have openings on the vitreous surface and intercommunicating openings. I feel confident that these observations of Lewis will have a great influence on the future study of the pathology of glaucoma. Obviously, then, if this is true, there must be a definite vitreous circulation, and this circulation must necessarily be controlled by the neurovascular system. Hence, the predisposing effect, long clinically noted, of mental stress and worry, severe emo-

*Read in Section on Eye, Ear, Nose and Throat, Southern Medical Association, Seventeenth Annual Meeting, Washington, D. C., Nov. 12-15, 1923.

tional disturbances, fatigue, auto-intoxication, etc.

But while we may admit that distention and swelling of the vitreous may be, and I believe probably is, the cause of high intra-ocular pressure, it cannot be regarded as the cause of glaucoma any more than swelling and opacification of the lens can be held as the cause of cataract. In other words, each of these conditions is but the clinical manifestation of an ultimate causation. We must, therefore, pry a little further into the pathogenetic mysteries of Nature and find the cause of the vitreous swelling, and there we shall possibly have discovered the ultimate cause of the disease syndrome "glaucoma." It is to be understood, of course, that only primary glaucoma is under discussion, but this may include both the simple chronic and congestive types.



Top—Fig. 1. Drawing from a section of a normal human eye (after Spalteholtz). The arrow indicates direction of incision for sclero-post-iridectomy, and shows the feasibility of the incision without danger to important tissues even in a normal eye. In a chronic glaucoma, with atrophied ciliary body, much more room is available for the incision. (See Fig. 2.)

Bottom—Fig. 2. Comparative drawings of ciliary area (after Fuchs) showing ciliary body in congestive glaucoma and in simple chronic glaucoma.

I am fully aware that the theory of the edematous vitreous as a factor in high intra-ocular pressure is not acceptable to some of our most brilliant observers. For example, Henry Dickson Bruns, in a personal communication to the writer, rejects it, and expresses the attractive view that the high tension is the result of diminishing capsular (scleral) elasticity plus nervous derangement, causing increasing intra-ocular secretion and thus destroying the delicate intra-ocular fluid balance. At intervals (until absolute glaucoma is established) the elasticity of the capsule reasserts itself, the excessive secretion is forced out *per vias naturales* and the tension falls. He believes that iridectomy is useless and superfluous, and that scleral section, the important feature of every successful glaucoma operation, by healing under pressure slightly increases intra-ocular capacity and perhaps capsular elasticity, or filtration, and so produces good results.

We cannot here review the many theories of intra-ocular secretion. For my part I am willing at this time to subscribe to the generally accepted view that this secretion originates in the ciliary or choroidal structures, or both. Clearly the secretion is of vascular extraction and controlled by vascular function, whether or not influenced in composition by glandular activity. And equally clearly the vascular function is controlled by a delicate and highly specialized portion of the nervous system. Since, in primary glaucoma, no local factor that could have any bearing on these secretory elements has yet been recognized, we are driven to conclude that this secretory control is subject to the vagaries of the central nervous system, while admitting the possible effect on secretory balance of local senile and trophic changes; though these, in common with the controlling nervous element, may be and often are largely influenced by dietary insufficiencies and indiscretions and endocrine disturbances. Pre-senility and early atheroma are not uncommon phenomena.

Here we are at the end of our tether so far as speculation on the ultimate causation of glaucoma is concerned, but I feel that the sequence is logical whether or not the premises be correct.

Now, we come to what we may call the secondary causes of high tension. In primary glaucoma I believe they are (1) the mechanical blocking of the pectinate ligament (and thereby of Schlemm's canal) by the iris periphery pressed forward by the water-logged vitreous and the advancing ciliary body and lens; (2) a natural inadequacy (though they may be entirely normal) of the drainage system of the anterior chamber and of the posterior channels (through the lamina cribrosa) to take care of the abnormally increased secretion.

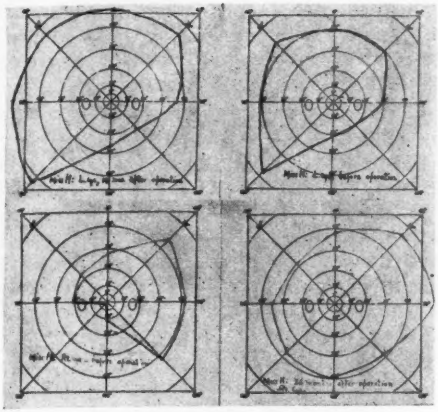
But how are we to explain the not infrequent presence of an anterior chamber of normal depth in a glaucomatous eye with high tension? My answer would be that in such an eye there is free filtration communication, through the fibres of the suspensary ligament, between the vitreous and anterior chambers (through the latter's posterior division), and the intra-ocular pressure is therefore equalized throughout. It is in such an eye that normal drainage is insufficient to cope with increasing fluid contents. Except for the depth of the anterior chamber the usual symptoms of the disease of course remain in evidence. It is in such an eye, too, that my reasoning leads me to believe any known operative procedure to be useless, unless a true filtering cicatrix can be produced. Otherwise, our only recourse must be to vigorous systemic treatment by the use of eliminants, sedatives, alteratives, the removal of focal infections, and perhaps glandular therapy.

(The deep chambered glaucomatous eye is also met with where changes in the aqueous content increase its density and lessen its diffusive possibilities, or where tumor pressure blocks the drainage angle or extends a cellular proliferation into the iris base, or where unusual ciliary activity abnormally augments the aqueous volume while the filtering capacity of the zonule is unequal to the task of equalizing pressure between the posterior and vitreous chambers. But these must nearly, if not quite, always be regarded as cases of secondary glaucoma and do not properly come within the purview of this discussion.)

Having briefly sketched certain causes and effects which I, for one, am forced to believe are fundamental in the consideration of primary glaucoma, let us now turn to the prospect of the control of these factors. As to the removal of the ultimate causes, it is obvious that we can turn only to those therapeutic measures to which reference has just been made. The hope they hold out is forlorn, but even so they are not to be forgotten or foresworn. Somewhat more promising is the possibility of modifying or removing the outstanding effect, intra-ocular high pressure, which is *per se* the most frequently responsible factor in the train of ills often culminating in blindness. From the time of von Graefe and de Wecker, results from Hirschberg, Nettleship, Charles Stedman Bull and others have shown that in about half the cases operation has put a stop to the progress of the disease. Our problem is to increase the percentage of arrest and improvement.

To my mind, the way to attack the high tension is not through the small and (from a standpoint of pressure) relatively unimportant anterior chamber; but through the large vitreous chamber where evidently the bulk of the pressure lies. The ordinary iridectomy cannot be relied upon to re-establish drainage for the simple reason that the incision must enter the anterior chamber in front of the iris attachment, which in these shallow chamber cases is on the inner corneal surface anterior to the pectinate ligament and closely covering and obstructing the latter. Necessarily, then, when the iris is grasped and withdrawn the direction of traction is not such as tends to separate the adherent iris root from its resting place and the resulting iridectomy is only partial, leaving the pectinate fibres as obscured and non-functioning as before.

Every operation that has ever been devised for glaucoma simplex that has met with any noteworthy success has dealt with the relations of the iris base, the pec-



Top—Fig. 3. Showing restricted field of an eye before operation, and the much larger field of the same eye 14 months after sclero-post-iridectomy.

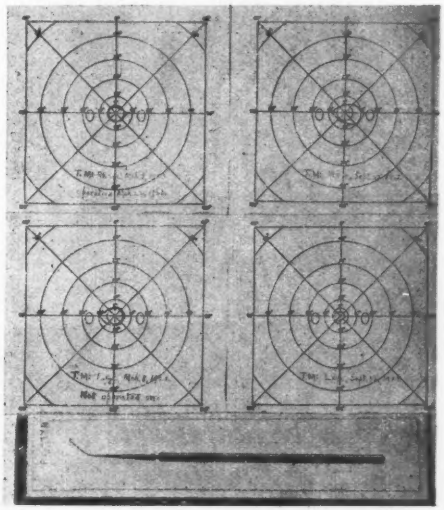
Bottom—Fig. 4. Showing restricted field of an eye before operation, and the much larger field of the same eye 26 months after sclero-post-iridectomy.

tinate ligament and the canal of Schlemm. And, furthermore, I am convinced that many failures, even where these relations have been properly disposed of, lie and have lain in the fault of not considering the possibility of relative blockage of the zonular filter and the absolute necessity of some means of decompression of the vitreous chamber.

For some time I meditated on these things, until about three years ago I formulated a tentative working plan which I thought would meet the indications as I saw them. The technic perfected, after many operations on pigs' eyes, I performed my first real operation about that time. About a year later I operated in the same way on the other eye of the same patient. Previous to operation the tension in each eye for months had been consistently from 40 to 55 mm. Hg. At this writing, three years after one operation and two years after the other, the tension in each eye is normal, that is ranging from 15 to 25 mm. Hg. In the meantime, between these two operations, I had operated upon a few other eyes, and up to this time I have operated upon seven eyes by this method. The difficulty of selecting cases for new and untried procedures will be easily understood, and this, in some measure, accounts for the paucity of cases upon which I am so far able to report.

In the May, 1922, issue of the Archives d'Ophthalmologie (Paris), L. Weekers writes that it is evident that it would be a great advantage in glaucoma to be able to do a direct decompression of the vitreous, and pointed out that fistulizing of the anterior chamber is an indirect way of accomplishing this. He tried sclerectomy at the level of the ora serrata, but it was not always successful, and he is now experimenting with the fitting of a small gold ring in the sclerectomy opening.

Twenty-five or thirty years ago Sterns (*Amer. Encyc. Oph.*), realizing the necessity of vitreous decompression, especially after ineffectual iridectomy, passed a Graefe knife through the cornea (within the limbus) and posteriorly directly into the vitreous. Schnabel (ibid.), in 1868, had tried a very similar procedure, and Hern, in 1899, an almost identical method. None of these efforts at the great desid-



Top—Fig. 5a. Showing gun-barrel field of an eye before operation, and the larger field of the same eye 7 months after sclero-post-iridectomy.

Center—Fig. 5b. Showing field of the other eye, same patient as Fig. 5a, but not operated upon. Fields taken on same dates as those of Fig. 5a.

Bottom—Fig. 6. Specially designed iris hook, being an ordinary blunt hook bent to angle of 30 degrees from the shaft at a distance of 8 mm. from the tip, the hook being at the inner aspect of the angle. This permits easy insertion from above cornea, without interference by the supra-orbital ridge.

Top—Fig. 7. Showing conjunctival flap turned down over cornea, and shorter scleral incision 2½ mm. above corneal limbus.

Center—Fig. 8a. Showing direction of scleral puncture and incision with Graefe knife. (The eye speculum was unintentionally omitted from the illustration).

Bottom—Fig. 9. Hook passed through scleral incision, between iris and lens, and engaging upper pupillary margin of iris.

eratum seem to have been sufficiently successful to endure, and for the evident reason that they all failed to deal effectively with the *vade mecum* of glaucoma surgery, namely, as previously mentioned; the relations of the iris base, the pectinate ligament and Schlemm's canal.

There is much to be said and little time and space in which to say it.

Before describing the operation I have devised, I should like to make it clear that I consider it applicable only in non-congestive cases of simple glaucoma which have already progressed to the stage of definite cupping of the optic disc, the stage in which, by the way, the oculist most often first sees the case, with shallowing of the anterior chamber; also perhaps in some cases of the very mild congestive type exhibiting similar changes. In acute inflammatory cases and in absolute glaucoma, inflammatory or otherwise, it is not applicable. (The operation can be modified to apply to these cases.)

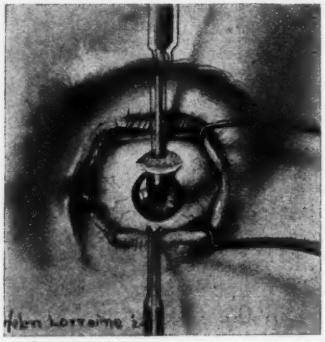


Fig. 8b.—Spatula entering anterior chamber through scleral incision, separating the adherent iris from inner surface of sclera and cornea, thus uncovering the pectinate ligament and Schlemm's canal. (This step was not used in the series of operations reported here. It has been adopted since with satisfaction.)

Fuchs, Collins and Mayou, de Schweinitz, and I believe others, have called specific attention to the fact that the ciliary body diminishes materially in size through atrophy as a result of glaucomatous pressure until at length it forms scarcely any prominence at all (Fig. 2). The atrophy affects the ciliary muscle as well as the processes. The recognition of this fact led me to believe it possible to obtain vitreous decompression through the zonule of Zinn (Fig. 1). In the normal eye the distance

Top—Fig. 10. Iris withdrawn on the hook and scissors in position to complete the sclero-post-iridectomy.

Bottom—Fig. 11. Operation completed and conjunctiva drawn back in place and sutured over scleral incision.

between the lens border and the ciliary processes is from one to two millimeters. With an atrophied ciliary body it is greater. A fair idea of bulbar anatomy ought to permit puncture and section of the zonular fibres without injury to the lens. If the ciliary processes are cut in the procedure it is of no consequence provided the technic is strictly aseptic. The method is as follows: I call the operation

SCLERO-POST-IRIDECTOMY

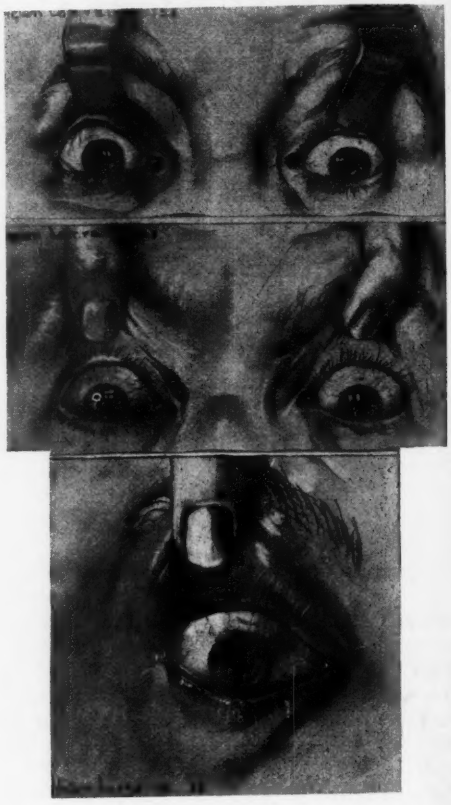
A horizontal incision 8 mm. long is made in the conjunctiva about 6 mm. above the corneal limbus. The conjunctiva is undermined carefully to within a millimeter of the limbus and the flap turned down over the cornea. At a point 2.5 mm. above the corneal limbus, a Graefe cataract knife, with the flat of the blade held parallel to the limbus, is then boldly plunged through the ocular tunic and contents for a distance of say 12 mm. directly toward the axial center of the globe (Figs. 7 and 8a). This carries the section through the sclera, the iris base, across the posterior chamber, through the zonule and into the vitreous structure (Fig. 1). Possibly, but not necessarily, some of the ciliary processes are incised. No matter. On withdrawing the knife the incision is enlarged to about 3 mm. An iris spatula is now insinuated through the scleral opening and between the iris and sclera, and carefully thrust into the anterior chamber until its tip is easily seen in the chamber between iris and cornea. The spatula is gently but firmly moved from side to side, as far as the scleral opening will permit, thus freeing the adhesions existing between the iris and the inner sclero-corneal surface (Fig. 8b). An iris hook of special design (Fig. 6) is then passed through the scleral opening into the posterior chamber, between lens and iris, and engages the pupillary edge of the iris from behind (Fig. 9). The iris is then drawn backward through the scleral wound and excised as in an ordinary iridectomy (Fig. 10). The conjunctival flap is replaced and secured with one suture, or more if preferred (Fig. 11).

Several things are accomplished by this relatively simple maneuvre. First, a sclerotomy is done, which may or may not be an item of importance (some men of wide experience think it is). Next, free communication is established between anterior and posterior chambers (a desideratum stressed by Curran in his peripheral iridotomy operation and emphasized by Gifford); next, the loosening of iris adhesions and the posterior inversion (asking pardon for the implied redundancy) of the iris strips it from its adhesion over the ligamentum pectinatum, thus reopening the blocked drainage. (Just here it is interesting to note de Schweinitz's observation that "the apposition of the periphery of the iris to the cornea in primary glaucoma may at first be unassociated with inflammation"); and last, but not least, we produce vitreous decompression through the zonular fibres, allowing the vitreous aqueous to diffuse freely into the posterior and anterior chambers.

The operation is designed to reduce tension and keep it reduced, not to cure glaucoma and restore vision. Please bear this distinction in mind. We all know that certain cases of glaucoma go on to ultimate blindness whether or not tension has been controlled. This is a different problem. I take it, too, that we all recognize the conscientious difficulties in getting clinical material (especially in private practice) upon which to try out novelties, so to speak, in operative technic. This is why, so far, I have done only seven operations upon human eyes, though in the past five years my records inform me that I have had more than fifty cases (over seventy-five eyes) of glaucoma in my care.

Of the cases operated upon by this method, three eyes were simple glaucoma (of several months' or years' standing). Two were of the mild congestive type of the disease; and two were absolute glaucoma, following congestive attacks. Of the latter type of disease, with severe pain and excessive tension, I believe there is little to say except that as a rule there is no operation short of enucleation that will provide permanent relief. Hence, I think I may be treating my method unfairly by including these cases in my report. But the record must be kept straight. Even of these two cases of absolute glaucoma, one with a painful tension of 85 mm., showed 12 mm. three weeks after operation, and then severe mental distress and domestic troubles and an attack of influenza supervened and two months after operation the tension had risen to 75 mm.; but even at that the patient was comfortable and free of pain. One year later tension was from 45 to 50 mm. and the patient continued comfortable and happy. The other one had a tension of 100 mm. just before operation. Three days later the tension was 35 mm.; but five weeks after that the tension had risen to 80 mm. with constant pain and the eye was enucleated. Macroscopic examination of the enucleated globe showed it so disorganized from an old previous panophthalmitis that nothing could have saved it.

Of the remaining five operations success may, I think, be fairly claimed for all. Tension before operation was 35 mm. and upward, 47 mm. and upward, and 55 mm., respectively, in the three of simple glaucoma. Two and three years, and eight months, respectively, after operation the tension in each was from 15 to 25 mm., one going recently to 30 mm. The two of mild congestive type I believe could be



Top—Fig. 12. Drawn from life. The right eye two years and the left three years after operation. Colobomas up and out, operation having been done with straight-shank iris hook, before special hook was devised. About one year after the sclero-post-iridectomy in the right eye, cataract extraction was done, entirely without unusual incident, and with resulting vision, with correction, of 20/20. The coloboma is covered by opaque capsular membrane, the pupillary area proper being clear.

Center—Fig. 13. Drawn from life, right eye 26 months after operation, left eye 14 months after operation. Pigmented spot above each cornea marks site of scleral entrance. Operation on right eye, with coloboma up and out, was done with a regular straight-shank blunt iris hook; in the left eye the specially devised hook was used, iridectomy being straight upward.

Bottom—Fig. 14. Drawn from life. Eight months after operation. The scleral incision is seen under the conjunctiva just above cornea. For field of this eye before and after operation, see Fig. 5a.

fairly said to be arrested. One with a tension of 32 mm. at operation showed 25 mm. a little over two years after; and the other with a tension of 47 mm. showed 24 mm. fourteen months after operation.

As to vision and fields: Of the three eyes of the pure simple chronic variety the vision of the first before operation was 20/40 with about ⅛ normal field. Following operation the field enlarged, later contracted, and now (three years after operation) is again widening and is perhaps one-fourth to one-third smaller than before operation. The vision remains at 20/40. The second eye of this series, with vision of 20/20 before operation, remains unchanged after two years. The field before operation was about ¾ normal, and its relative changes have been as in the first eye. The third eye of this series had a vision before operation of 20/20 minus, and what we might term a knot hole, or gun-barrel field of only five degrees around the entire periphery except at the horizontal temporal line, which went to seven degrees. Eight months after operation vision is 20/30 plus, and the field has extended to from five to twelve degrees, touching the five degree circle at only two points. The field is about doubled (Figs. 5a and 5b).

Of the two eyes of mild congestive type operated upon, one had vision of counting fingers at ten feet and a field one-fourth of normal. Twenty-six months after operation vision is 20/100 and the field is two-thirds normal (Fig. 4). The other had vision of 20/200 before operation and a field one-half normal. Fourteen months after operation vision is 20/40 and the field is three-fourths normal (Fig. 3).

It is with the utmost hesitancy and diffidence that I present to you these facts and observations. The writer fully realizes that in such cases the percentage of arrest and improvement as reported here greatly exceeds the claims of most other methods of attack upon this formidable disease. Too well, also, he realizes that this treatment of the subject is but a beggarly and meagre contribution to the great issue and that the number of cases he can report is pitifully small and *ipso facto* necessarily unconvincing; for, in the words of the immortal Huxley to the Frenchman Gratiolet: *"Il est dangereaux dans les sciences de conclure trop vite."*

I know only too well the criticisms my suggested method will arouse. The possible inclusion of iris or ciliary tissue in the scleral wound; the possible injury to the ciliary body and to the lens; the danger of zonular rupture and extrusion of the viscid vitreous into the anterior chamber to further block drainage, will all be attacked as being more or less reprehensible and indefensible. Some great ophthalmologists have deliberately tried to include iris tissue in the wound for drainage, though this is not my object. Herbert does it; Holth does it; Borthen has reported a high percentage of success with his operation of iridotasis, which is essentially iris inclusion; White, of Richmond, has reported successful operations by this method; and a few years ago Dunbar Roy, of Atlanta, and recently Wilder, of Chicago, reported a number of cases with happy results from this method. There are many others. Vitreous often flows into the anterior chamber following capsular operations, but it seldom if ever causes harm.

Again, there is no harm done by a clean wound of the ciliary processes if it should occur. Injury to the lens might happen in this operation, but it occasionally happens in nearly all operations for glaucoma. Here it will happen but seldom if the operator is dextrous and careful. Answering further objections I can only say that a small opening in the suspensory ligament is of no moment and very little if any of the viscid contents of the vitreous chamber will escape, while the watery element will freely flow into the anterior segment for drainage.

In conclusion, please let me make it clear that this is only a preliminary report and its meagerness may well and properly be taken as a just criterion of its worth. I cannot complain. Only let me remind you that I am urging no one at this time to try this procedure, though I should eagerly welcome any help to prove or disprove its value. I am merely offer-

ing my poor thoughts and the report of a piece of work to my colleagues, who, I know, must often have thought anxiously upon a subject as common as it is unintelligible, as large as it is elusive.

DISCUSSION

Dr. J. W. Burke, Washington, D. C.—When I first read Dr. Jervey's paper I must say I was shocked at his boldness in plunging a knife back into the vitreous of an eye with good vision, which we have been taught to feel is the holy of holies of the eye.

Assuming that Parke Lewis is correct and that there is a watery circulation in the vitreous chamber, and that increased tension in the eyeball is due to its faulty absorption or increased production, either an operation connecting the vitreous and aqueous chambers, or some form of trephine behind the ciliary body is necessary. Dr. Jervey's method seems to give the only way in which a communication can be established between the vitreous and aqueous chambers. The average eye surgeon, and even the most dextrous, will find that he has injured the lens much oftener than is done even with a keratome in iridectomy. It is seldom injured in those sections made with a cataract knife, such as the LaGrange operation or one of its modifications, and I do feel that we cannot with impunity injure the ciliary body. We all recall that a perforating injury of the globe, in which the ciliary body is involved, will make us remove an eye that we might otherwise give a chance to recover. I can also recall two cases of late detachment of the retina in small wounds of the ciliary body which healed smoothly and were allowed to remain, and I think that this will be a late complication of this operation to be kept in mind.

Undoubtedly the method of the removal of the iris has much in its favor, as it gives an opportunity to strip the adherent iris from the back of the cornea, which other methods do not, with the exception of Heine's cyclodialysis, and possibly Elliott's trephine. There the removal of the iris is of secondary importance in the establishment of drainage, but here where one is making an effort to drain at the iris angle a broad iridectomy is desirable, and one is limited very much by a small incision.

Parsons pooh poohs the theory of the swelling of the vitreous causing increased tension in the eyeball and decries anything that will increase the burden on the filtration angle, which an admixture of the vitreous with the aqueous would apparently do. But how few cases of discission in secondary cataract develop increase of tension, though we are not usually dealing with an impaired filtration angle in these cases.

Here we have reports of five cases, as I think Dr. Jervey should not include his two cases of absolute glaucoma, in which the tension has been kept down within normal limits for varying periods up to three years. In spite of the theoretical objections we may have to the method, we cannot lose sight of the fact that it has been successful in all the cases in which Dr. Jervey has used it, and I think we should give this method very careful thought and study.

Dr. Hiram Woods, Baltimore, Md.—I want to mention one complication in simple glaucoma, and that is the gradual development of friability of the iris, so that when you try an iridectomy the forceps merely cut through the tissue. I should like to ask Dr. Jervey if he has met with that complication, and if so, how the iris behaves when his hook is used?

Dr. Jervey (closing).—Dr. Burke referred to the only other methods approximating the posterior stripping of the iris from the cornea, the Heine method, and the Elliott trephine. But I think either one of these methods is essentially different from the one I suggest. The Elliott trephine operation must be through the area of Schlemm's canal. Otherwise it is unsuccessful. I think Elliott agrees with that dictum. As to the Heine cyclodialysis, there has been much discussion as to the benefits to be derived from it. It is not an iridectomy; it is simply a dialysis of the ciliary body and iris base from the inner scleral and corneal surfaces, and statistics seem to show that after the dialysis there is a re-attachment and more or less fibrosis at the site of operation. However, many satisfactory results have been secured from the cyclodialysis procedure, and I think oftentimes a combination of my method of posterior iridectomy with an iridodyalysis would be an excellent thing.

I am sure, although Dr. Burke has spoken of this as being a formidable procedure, that it is an easier method of iridectomy than any other I have attempted to perform. The control is easier than with forceps that have to be used with equal pressure on two fingers, and as far as the iridectomy is concerned it is far less liable to injure the lens than the rat-toothed forceps in the anterior chamber. With ordinary care the knife can be passed through into the vitreous without coming into dangerous proximity with the lens structure.

Answering Dr. Woods, I have of course met with such irides in glaucomatous cases. I should not expect to meet such conditions except in cases which have gone through serious and severe attacks of the disease, and those cases are the cases to which the procedure I have reported is not applicable. I think most of this friable tissue is in very severely congested cases complicated by cyclitis. I have not met with any in my series.

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EDITORIAL DEPARTMENT

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TREATMENT OF HAY FEVER

Within the past decade have come into practical use the results of some very excellent work in the diagnosis and treatment of the so-called allergic states, hay fever, asthma and urticaria. A very large percentage of these cases is now known to be caused by hypersensitiveness to the proteins found in various animal and vegetable products. These substances, when inhaled or ingested, bring on the manifestations known as hay fever, asthma or urticaria. Inhalation of the pollen of various plants causes hay fever and some cases of seasonal asthma.[1] This fact explains the long observed regularity of the recurrences of these attacks.

There are three hay fever seasons and practically all cases are confined to one of them, although an occasional case may have a multiple sensitization and have spells in any two or all three of the seasons. About 90 per cent or more of these sufferers have the fall type, which begins some time in August and lasts until frost. This type is caused by ragweed. In the Northern and Eastern states this weed begins to pollinate regularly about the tenth of August, while in the Southern states the season is a little later, about August 20. The summer type begins in the months of May or June and lasts varying periods, usually through July. This type is due to the grasses, and in timothy growing sections this grass, grown so extensively for hay, is a very large causative factor. In some clinics it is considered to be, in the Eastern states, practically the sole cause of the summer type.[2] In some sections, corn pollen is the principal cause of this type of the trouble. Then there is a rare type which begins in February or March and is caused by pollinating trees.

The hay fever sufferer can be given a large degree of comfort and in many cases rendered entirely free of symptoms by prophylactic inoculations with solutions of the proper pollens. The treatment should begin about fifteen weeks before the onset of the season and injections should be given at intervals of five to seven days until time for the season to open. By this time a high degree of immunity will have been induced in a very large percentage of cases.

In deciding what is the proper pollen to use in treatment, skin tests are made. Small amounts of the solutions of the various pollen proteins are injected intracutaneously or are applied to small scratches on the skin. The one to which the patient is sensitive will react by formation of an urticarial wheal around the site of the test.[3] However, any case which has onset definitely at or soon after August 10 to 20, according to the locality, can be treated with ragweed with a high degree of certainty of results. It is also just as cer-

1. Scheppegrell, Wm.: Hay Fever and Asthma. Lea & Febiger, 1922.

2. Cooke, Robt. A.: Vander Veer, Albert, Jr., and Brown, Aaron: Studies in Specific Hypersensitiveness. Journal of Immunology, March, 1922.

3. Walker, I. C.: Oxford Loose Leaf Medicine, Oxford University Press, Vol. ii, 1921, pp. 238-249.

tain that any case which starts regularly before August 10 to 20, according to the locality, cannot be due to ragweed entirely, and probably failure will result from treating these cases for ragweed alone.

The causes of the summer and early spring types cannot be predicted with nearly the same certainty as the fall type. In Alabama, for example, a large percentage of the summer type is caused by corn pollen and these sufferers have recurring spells or one continuous spell from May until frost. In the timothy growing sections this grass is the most frequent cause. In the early spring type, no one tree has been especially implicated, and there is probably a wide variation according to the residence of the sufferer.

The diagnosis and treatment of asthma and urticaria, while not so frequently satisfactory as that of hay fever, offer a high degree of help to a large percentage of cases. About 40 to 50 per cent of asthma cases can be rendered free of symptoms by finding to what proteins they are sensitive and removing them from contact or treating for the offending protein. Another 30 to 40 per cent will be definitely helped, though not rendered entirely free. Practically all workers agree that the treatment of urticaria is the least satisfactory of all. However, many of these cases can be given a great deal of help and many entirely relieved of the trouble.

STATUS OF INSULIN THERAPY

Two years ago this past January insulin was first administered to a human diabetic and its use for another year was limited to a few selected clinicians. Insulin has not been available to the general profession for more than a few months, yet, according to an estimate by a speaker in the Symposium on Diabetes* at the November meeting of the Southern Medical Association, in the United States alone, from 20,000 to 30,000 diabetics are already receiving the benefits of this new discovery. Insulin is being used in every country in the world in which scientific medicine is known and practiced, and there has not been a dissenting opinion of its value from a clinician of any standing. Therefore, it may be said that insulin has passed the experimental stage. Just what it will and will not do is common knowledge in the medical profession.

Like other medical discoveries, insulin has suffered from lay publicity, though not through the fault of Banting and his associates, who published their work only to the medical profession. Perhaps it might have been better had they given the facts to the lay press at the outset and thus prevented the garbled and exaggerated reports of the curative powers of insulin from being broadcasted by newspapers and magazines and even over the radio. The discoverers of insulin have never claimed it as a cure for diabetes, nor have they ever stated that "with the use of insulin a diabetic can eat anything he wants." Indeed, they were modest in their claims and the results from its use in the hands of many clinicians prove that while not a cure it has already saved many lives, and that today many thousands of diabetics are healthy, strong and efficient, who without insulin would have been doomed to lives of semi-invalidism, only to die in a few years from the results of malnutrition.

Insulin does not make dieting any less important in the treatment of diabetes; but on the contrary in using insulin it is essential to know the exact amounts of glucose-forming foods and fats that the patient is taking. Therefore, as in the pre-insulin days, teaching food values to diabetics is essential to the successful management of diabetes.

*Symposium on Diabetes, pp. 145 anl 176 of this issue.

It is not necessary to use insulin in every case of diabetes, since by diet alone the mild case can be kept well nourished with a normal blood sugar and with urine sugar free. It is estimated that approximately one-half the diabetics belong to this class.

The indications for using insulin may be stated as follows:

(1) Any case of diabetes in which the urine cannot be kept sugar free on a diet that will maintain the normal weight and bodily vigor of the patient.

(2) In mild diabetes complicated with infections, such as bronchitis, pneumonia, or the surgical infections. A mild diabetes may be changed into a severe case in a short time by infection of any kind.

(3) In acidosis, either in coma or the pre-comatose stage.

(4) In diabetic gangrene.

(5) Before and after surgical operations upon diabetics, to prevent acidosis.

The following question is frequently propounded to clinicians using insulin: "Is it necessary for a diabetic to use insulin the remainder of his life?" In some severe cases the continued use of insulin will be necessary. In others, as in cases of mild diabetes with a transient infection, the insulin may be discontinued after the infection has subsided. In many of the moderately severe diabetics the use of insulin for a few days or weeks, combined with improved conditions of personal hygiene, including the diet suited to the needs of the particular case, may so rest the islands of Langerhans in the pancreas that their ability to produce insulin will be increased and the artificial product may be discontinued. There is no reason why insulin should not be left off if the patient's blood sugar can be kept under 120 milligrams per 100 mils of blood on a diet that will keep him well nourished.

Physicians and patients often make inquiries about the potency of pancreatic extracts, in tablet or powder form, in diabetes. It may be stated with emphasis that the extracts containing the external secretion of the pancreas have no value whatever in diabetes, because insulin is destroyed by trypsin. Insulin is also destroyed by pepsin so that there is no known way of giving insulin by mouth. Apparently insulin as soon as it is secreted in the islands of Langerhans is carried into the blood stream; and for the artificial product to be effective it must be given subcutaneously, or intravenously in profound coma.

The dangers of the hypoglycemic reaction, unfortunately called "insulin shock," have been greatly exaggerated. It is unlikely that the size of the dose of insulin that is given in human diabetes can lower blood sugar to the lethal limit of 40 milligrams per 100 mils of blood. It is well to teach the patient the symptoms of the hypoglycemic reaction and that a half glass of orange juice or a piece of candy will relieve the symptoms following an excessive dose of insulin. He should be taught not to fear the hypoglycemic reaction.

Insulin therapy has advanced to the point where it may be said that it, with diet, has placed one disease upon an accurate scientific basis. Insulin in the treatment of hypo-insulinism (diabetes) is on an even firmer basis than is the use of thyroxin, or thyroid extract, in hypothyroidism (myxedema or cretinism), for the reason that the results obtained in controlling blood sugar by the use of the internal secretion of the pancreas can be determined with accuracy by simple blood and urine tests, while the physiological effects following the use of thyroxin, or the thyroid extract, can be determined only by the use of elaborate basal meta-

bolic apparatus or by waiting for the therapeutic results.

The fact that the Nobel prize was awarded to Banting and his associates for their researches is added proof, if such were needed, that insulin is the greatest discovery in medicine of this Century. That insulin is and will continue to be one of the great boons to humanity is accepted by those who have witnessed its marvelous results in the cases of diabetes that prior to a year ago would have been considered hopeless. Therefore, Banting will be ranked along with such men as Harvey, Jenner, Pasteur, Lister, Long, Koch and Reed, immortals whose names will go down through all ages as benefactors of mankind.

NEGRO EMIGRATION AND HEALTH CONDITIONS

History teaches that governments, like human beings, are born, grow, reach maturity and usually pass away because of some organic or functional disease within themselves which might have been prevented had an accurate, timely diagnosis been made and proper remedial measures been applied. In a healthy government, as in a healthy individual, the component members must function normally and in close correlationship with each other.

The problem of maintaining a successful, permanent, democratic government in the South will always be grave because large numbers of two races are involved, white and black, former master and former slave, forced into close civic relationship with one another.

There is apparently a widespread dissatisfaction among the negro farm and urban labor of the South at the present time. Approximately 80,000 negroes emigrated from one Southern state alone within a period of a few months to industrial centers in the North. Some are returning, but more are leaving each day.

The negroes claim that they can secure better wages and find more satisfactory living conditions in Northern cities. Others say that they do not always receive justice in the Southern courts.

Another cause which has contributed no doubt to the movement North is the fact that the so-called cheap foreign labor from European countries practically ceased to enter the United States with the beginning of the World War. With both the American Legion and the American Federation of Labor favoring the emigration law as it now stands, there is considerable doubt that it will be materially changed for some time to come.

The negro fills a most useful place in the economic welfare of the South, and there is every reason for so improving his condition that he will wish to remain. It is obvious that the schools for negroes are sadly inadequate and overcrowded. In some states there is no provision made for the negro insane and their eleemosynary institutions throughout the South are as a rule overcrowded and poorly equipped. Rickets and malnutrition, diseases of improper feeding and poor housing conditions, are common among the race. Tuberculosis and syphilis among them take a heavy annual toll in the North and South.

Epidemic disease control in the South has made wonderful strides in the last few years. A steady improvement of negro institutions and rural health conditions will tend to keep the better class of negroes in the South and attract the desirable type of white farmers as well. The good work begun in malaria, hookworm, and all intestinal diseases must be carried on to complete control. The medical profession and public health agencies in the South have never been called upon to render a greater service to their section than

in this emergency of negro labor exodus. No body of men can do more than they to remedy the present disorder and prevent elsewhere what has already proven to be economic disaster in many rural portions of the South.

Book Reviews

Practical Chemical Analysis of Blood. A Book Designed as a Brief Survey of this Subject for Physicians and Laboratory Workers. By Victor Caryl Myers, M.A., Ph.D., Professor and Director of the Department of Biochemistry, New York Post-Graduate Medical School and Hospital. Second Revised Edition, with 232 pages, illustrated. St. Louis: C. V. Mosby Co., 1924. Cloth, $4.50.

All the standard methods of determining blood constituents are so described as to be fairly comprehensible even for the beginner in biochemistry. Methods of acid-base determination are described at length, and a full discussion of the clinical significance of all the determinations is included. Discussion of the chemical reactions involved and the compounds formed is for the most part omitted.

This is probably the best book available on the subject for the physician and for the hospital or private laboratory.

Human Protozoology. By Robert W. Hegner, Ph.D., Professor of Protozoology, and William H. Taliaferro, Ph.D., Associate Professor of Protozoology, School of Hygiene and Public Health, Johns Hopkins University. With 596 pages, illustrated. New York: The Macmillan Co., 1924.

This is a work of particular interest to students and public health officials. It is extremely well grounded and elementary. A chapter on the diagnosis of intestinal protozoa concludes the book.

Collected Papers of the Mayo Clinic, Rochester, Minn. Edited by Mrs. M. H. Mellish. Volume XIV, 1922. Octavo of 1394 pages, with 488 illustrations. Philadelphia and London: W. B. Saunders Co., 1923. Cloth, $13.00 net.

This volume of a year's work is up to the usual standard of the Mayo Clinic. The surgical and medical treatment of gastric ulcer is dealt with in several chapters. The relation of the extirpation of the liver to the blood sugar level has been studied, and the reports are of considerable interest. There is some experimental work in the production of urinary calculi by the devitalization and infection of teeth in dogs with streptococci from cases of nephrolithiasis.

The book is valuable from three standpoints: it contains reports of unusual and interesting cases; it contains statistical data and numbers of ordinary and some less ordinary types of cases; and it has original experimental work of merit.

Medical and Veterinary Entomology. A Textbook for Use in Schools and Colleges, as Well as a Handbook for the Use of Physicians, Veterinarians and Public Health Officials. By William B. Herms, Professor of Parasitology, University of California; Consulting Entomologist, California State Board of Health, and Formerly Professor of Zoology and Parasitology, San Francisco Veterinary College; Member National Malaria Committee; Author of "Malaria, Cause and Control," "A Laboratory Guide to the Study of Parasitology," "The Housefly in Its Relation to the Public Health," "Housefly Management," etc. Second edition, completely revised, with 462 pages, illustrated. New York: The Macmillan Co., 1923.

This second edition of a very comprehensive work will be of interest to students and public health officials, as well as to physicians interested in the later developments of knowledge of insect carriage of disease. Ordinary insects, such as lice, bedbugs, mosquitoes, horse flies, house flies, ticks, mites, and many less known insects, are thoroughly discussed with the diseases which they bear and methods of controlling them. The illustrations are particularly numerous and instructive.

The Medical Clinics of North America, University of Kansas Number, Vol. 7, No. 4, January, 1924. 66 illustrations and 311 pages. Philadelphia and London: W. B. Saunders Co., 1924. Bimonthly. Paper, $12.00.

The present number contains many good clinics. Dr. Russell L. Haden's clinic on the use of volume index in the study of blood in anemia and Dr. Logan Clendining's clinic on subphrenic infection, cases illustrative of the different forms of this condition, are selected as being worthy of special mention.

Clinical Memoranda for General Practitioners. By Alex Theodore Brand, M.D., C.M., V.C., Medical Officer Driffield Poor Law Institution; Medical Officer, Driffield Cottage Hospital; Late Major, R.A.M.C.; Author of "Cancer: Its Cause, Treatment and Prevention;" and John Robert Keith, M.A., M.D., C.M., Deputy Medical Officer, Driffield Poor Law Institution; Medical Officer, Driffield Cottage Hospital. 273 pages. Second edition. New York: William Wood & Co., 1924. Cloth, $3.00.

The authors attempt to present points of practical value in diagnosis and treatment. The first part of the book covers this phase of the subject, and here at times one notes serious errors of omission and commission. As examples, there is no mention of tetanus antitoxin in the treatment of tetanus, and under "Medical Treatment of Appendicitis" they advise one-half grain of calomel every hour until the bowels have moved.

The second section is made up of aphorisms, some of which are worth remembering.

The authors seem to be writing down to their readers.

Clinical Laboratory Diagnosis. Designed for the Use of Students and Practitioners of Medicine. By Roger Sylvester Morris, A.B., M.D., Professor of Medicine in the University of Cincinnati and Director of the Medical Clinic of the Cincinnati General Hospital; Formerly Associate Professor of Medicine in Washington University, St. Louis; Associate in Medicine, the Johns Hopkins University, and Associate Resident Physician, the Johns Hopkins Hospital; Instructor in Medicine and Demonstrator of Clinical Medicine, the University of Michigan. With five plates in colors, 99 text figures and 456 pages. New York and London: D. Appleton & Co., 1923.

Although primarily intended as a text book, this volume would be of real value to all others interested in acquiring a working knowledge of laboratory methods and their proper valuation and interpretation in the diagnosis of disease. The author is fortunate in having the gift of presenting his subject in a clear and easily understandable manner, probably because of his many years' experience as a teacher of medical students.

Neurologic Diagnosis. By Loyal Edward Davis, M. S. M. D., Ph. D. in Surgery; Assistant Professor in Surgery Northwestern University Medical School; Fellow of the National Research Council: 49 text figures; 173 pages. Philadelphia and London; W. B. Saunders Co., 7923. Cloth, $2.00 net.

The author presents his subject from the viewpoint of correlating symptoms with anatomic and physiologic facts. The book is divided into two sections. The first section takes up neurological manifestations in general and methods of examination. The second section deals with illustrative cases.

The little book is well written and should serve a useful purpose.

The Primary Problems of Medical Psychology. A textbook for students and practitioners. By Dr. Ch. DeMontet, Professor of Medical Psychology at the University of Lausanne. Translated by A. Newbold. 142 pages, New York; William Wood & Co., 1923. Cloth, $2.50.

It is seldom that one reviews a manual which is better written. The subject of psychology as it applies to medicine is simply, but fully, presented. The book is well worth reading and one is impressed by its author's grasp of the subject.

The Examination of Patients. By Nellis B. Foster, M.D., Associate Physician, New York Hospital; Associate Professor of Medicine, Cornell University College of Medicine. 253 pages, illustrated. Philadelphia and London: W. B. Saunders Co., 1923.

Dr. Foster has avoided tiring his readers by descriptions of useless details and obsolete methods, thus rendering the book admirably fitted for the purpose for which he intended it—that is, an aid to the practitioner of medicine.

The plates are excellent presentations of the conditions described. Altogether the work is an exceedingly good handbook for review on physical diagnosis.

Local Anesthesia: Its Scientific Basis and Practical Use. By Prof. Dr. Heinrich Braun, Obermedizinalrat and Director of the KGL. Hospital at Zwickau, Germany. Translated and Edited by Malcolm L. Harris, M.D., Professor of Surgery, Chicago Polyclinic; Chief Surgeon, Alexian Brothers Hospital; Surgeon to the Henrotin, Polyclinic and Passavant Hospitals, Chicago, Ill. Second American from the Sixth Revised German Edition, with 411 pages and 231 illustrations in black and colors. Philadelphia and New York: Lea & Febiger, 1924. Cloth, $5.00.

This volume covers the history and general theory of local anesthesia and the local anesthetic agents, giving their graphic formulae, chemical and physiological properties. Methods of injection in all parts of the body cover about 200 pages. In view of its conciseness and exactness and the widening field of local anesthesia, the book should be of value to most men doing surgical work.

A Manual of the Practice of Medicine Prepared Especially for Students. By A. A. Stevens, A.M., M.D., Professor of Applied Therapeutics in the University of Pennsylvania; Visiting Physician to the Philadelphia General Hospital. Eleventh edition, entirely reset, with 16 text figures and 645 pages. Philadelphia and London: W. B. Saunders Co., 1923. Cloth, $3.50 net.

This little book has been a favorite with the medical student. The author has had extensive experience in teaching, and, therefore, presents his subject briefly and clearly. It is questionable that the inclusion of a section on diseases of the skin is of advantage in this type of manual. It also seems strange that in a book of so recent date the treatment of diabetes mellitus by insulin should be dismissed with one paragraph.

The text has been extensively revised, and sections on chronic family jaundice, arteriosclerotic kidney, secondary hyperthyroidism, thrombo-angitis obliterans, progressive lenticular degeneration, tumors of the lungs and pleura, botulism, epidemic encephalitis and subacute combined sclerosis of the spinal cord have been added.

Other Books Received

Walking for Health. By Alvah H. Doty, M.D., Medical Director, Western Union Telegraph Co., Formerly Health Officer, Port of New York. With 44 pages. New York and London: D. Appleton and Co., 1923.

Poison Mysteries in History, Romance and Crime. By C. J. S. Thompson, M.B.E., Author of the "History and Romance of Alchemy and Pharmacy," etc. With 412 pages, illustrated. Philadelphia: J. B. Lippincott Co., 1924 Cloth, $3.50.

Alcohol and Prohibition, in Their Relation to Civilization and the Art of Living. By Victor G. Vecki, M. D., San Francisco, Cal. With 165 pages. Philadelphia and London: J. B. Lippincott Co.

Southern Medical News

ALABAMA

Dr. L. L. Cannon, Montgomery, with the State Health Department, has been appointed Secretary of the Medical Association of the State of Alabama to fill the unexpired term of the late Dr. H. G. Perry.

W. T. Fales, B.S., Johns Hopkins School of Public Health, Baltimore, has been elected Director of the Bureau of Vital Statistics of the State Board of Health to succeed the late Dr. Perry.

Dr. Nathaniel A. Barrett succeeds Dr. J. M. Long as Managing Director of the Birmingham Baptist Hospital.

Dr. D. T. McCall, Mobile, has been appointed a member of the State Board of Health to fill the vacancy caused by the death of Dr. V. P. Gaines, Mobile.

A bill has been introduced into Congress providing for the removal of the Mobile quarantine station from Fort Morgan to Sand Island and appropriating $500,000 for the erection of a new station.

Dr. Carl A. Grote, Health Officer of Greensboro, N. C., has become associated with the Merrimack Manufacturing Company, Huntsville. Dr. Grote was formerly City Health Officer of Huntsville.

Deaths

Dr. William Barnett Allgood, Allgood, aged 82, died suddenly January 6 from senility.

Dr. James Wilson Acker, Montevallo, aged 86, died recently from senility.

ARKANSAS

Benton County Medical Society has elected Dr. C. F. Perkins, Rogers, President; Dr. J. S. Thompson, Gravette, Vice-President; Dr. H. J. G. Koobs, Rogers, Secretary-Treasurer.

Desha County Medical Society has elected Dr. Vernon MacCammon, Arkansas City, President; Dr. W. H. DeClark, McGehee, re-elected Secretary-Treasurer.

Faulkner County Medical Society has elected Dr. H. C. Burnett, Wooster, President; Dr. J. M. Muse, Conway, Vice-President; Dr. J. S. Westerfield, Conway, Secretary-Treasurer.

Franklin County Medical Society has elected Dr. J. L. Post, Altus, President; Dr. W. C. Porter, Vice-President; Dr. Thos. Douglass, Secretary-Treasurer.

Hempstead County Medical Society has elected Dr. M. V. Russell, President; Dr. W. M. Garner, Vice-President; Dr. J. H. Weaver, Secretary-Treasurer.

Independence County Medical Society has elected Dr. W. P. Moore, President; Dr. K. W. King, Vice-President; Dr. T. N. Fodman, Secretary.

Jefferson County Medical Society has elected Dr. J. M. Lemon, President; Dr. C. K. Caruthers, Vice-President; Dr. J. T. Palmer, Secretary-Treasurer.

Mississippi County Medical Society has elected Dr. E. V. Hill, President; Dr. H. C. Sims, Vice-President; Dr. F. D. Smith, re-elected Secretary-Treasurer.

Union County Medical Society has elected Dr. S. J. McGraw, El Dorado, President; Dr. A. D. Cathey, El Dorado, Vice-President; Dr. D. E. White, El Dorado, Secretary-Treasurer.

At a special meeting of the Council of the Arkansas Medical Society at Little Rock, in January, a resolution was passed favoring a check of the records of the State Board of Medical Examiners and the State Eclectic Board. A committee was appointed to check and verify the records of the Board from its beginning to the present time. If any fraudulent licenses are found steps will be taken to revoke them. Persons who practice in Arkansas shall meet the standards set up by the Association of American Medical Colleges. A new bill to meet these requirements will be introduced in the next session of the General Assembly by a committee appointed to draft the bill.

Deaths

Dr. John Franklin Sanders, Blytheville, aged 60, died December 27 from cerebral hemorrhage.

Dr. Royal Walter Darr, Atkins, aged 45, died December 31.

DISTRICT OF COLUMBIA

The Georgetown University School of Medicine, Washington, will award a gold medal annually to the member of the Association of American Physicians who has rendered the greatest service in the year to progress and achievement of medical science and preventive medicine. This was announced recently through the Georgetown Endowment Association in connection with a $16,000 fund established by Dr. George M. Kober, Dean, in commemoration of the fiftieth anniversary of his graduation in medicine from the University. Under terms of the Kober endowment an annual scholarship from the interest of $4,000 is established, preference in the award to be given to residents of the District of Columbia and of Modoc County, California.

At the annual meeting of the Medical Society of the District of Columbia, Washington, January 2, the following officers were elected: Dr. John D. Thomas, President; Dr. Coursen B. Conklin, Secretary; Dr. William J. Mallory, Legislative Chairman.

The French Government has made Dr. Leland O. Howard, Chief of the Bureau of Entomology of the Department of Agriculture, Washington, a Chevalier of the Legion of Honor in recognition of his services to agriculture.

Plans are being made for the erection of a new wing for Columbia Hospital for Women, Washington, as a modern home for nurses.

Dr. Royal S. Copeland, U. S. Senator from New York, has introduced in the Senate a resolution which directs the Commissioners of the District of Columbia to draft proposed legislation to protect the people of the District against incompetent, unscrupulous and otherwise unfit practitioners.

(Continued on page 34)

CASCARA AROMATIC, S & D.

(FLUIDEXTRACT CASCARA SAGRADA, AROMATIC, S & D)

CASCARA AROMATIC S & D IS A TRUE FLUIDEXTRACT, EACH FLUID OUNCE OF WHICH REPRESENTS ONE OUNCE OF CAREFULLY SELECTED AND PROPERLY SEASONED CASCARA BARK.

OUR CASCARA AROMATIC IS NOT RE-INFORCED BY OTHER LAXATIVE DRUGS, BUT DEPENDS SOLELY UPON THE SPECIFIC LAXATIVE PROPERTIES INHERENT TO THE CASCARA BARK.

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OUR ORIGINAL AND EXCLUSIVE PROCESS OF MANUFACTURE, COMBINED WITH OUR CAREFUL BLENDING OF AROMATICS, EFFECTUALLY DISGUISES THE BITTER PRINCIPLES OF THE CASCARA, AND SO MATERIALLY ENHANCES THE PALATABILITY, WITHOUT INTERFERING WITH ITS THERAPEUTIC ACTIVITY, THAT CASCARA AROMATIC S & D STANDS OUT AS PARAMOUNT IN THIS CLASS OF PRODUCTS.

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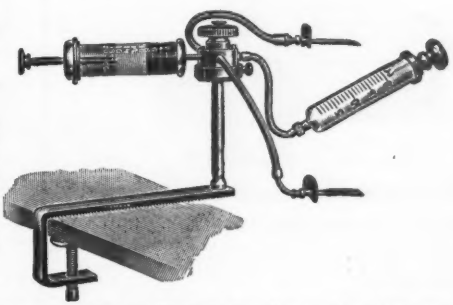
HE Unger Transfusion Apparatus is designed with the idea of expediting blood transfusion combined with an accurate method of gauging the amount of transfusion and eliminating the possibility of clot or air injections.



It consists of a carefully ground revolving "well" by which the blood can be drawn from the donor and injected into the recipient by the pumping action of a 20 cc Record syringe and only entailing a half turn of the wheel on top of the well. The apparatus is also supplied with a 20 cc Luer syringe for the injection of saline. This can be used for both eliminating the air from both canulas before the machine is put in operation, and a continuous small amount of saline can be injected throughout the transfusion, the amount recommended by the author being about 1 cc of saline to each 20 cc of blood.

The apparatus has met with great favor among the medical profession and we are prepared to supply the complete apparatus or any part of it upon short notice. A reprint by Dr. Unger will be sent on request.

Price complete with both needles and both syringes $41.00

Separate prices on request.

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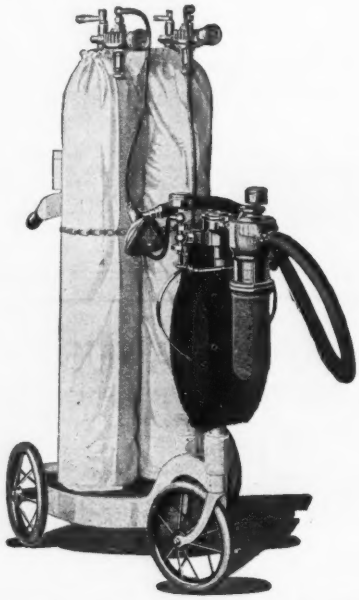
has been developed at the Presbyterian Hospital, Chicago, a noted teaching institution, through the use of nine McKesson Universal Units. Many other noted surgeons, anesthetists and hospitals are using McKesson Apparatus in giving ethylene-oxygen anesthesia, because its safe and satisfactory administration needs the same automatic, intermittent flow of accurate percentage gas mixtures, under controlled pressure, just like nitrous oxid-oxygen.



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Toledo Technical Appliance Co.

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Toledo, Ohio.

(Continued from page 232)

The purpose of the resolution is to effect more adequate protective laws for the District of Columbia against incompetent practitioners of medicine under all systems of practice.

Deaths

Dr. James A. Watson, Washington, aged 67, died January 11.

FLORIDA

Deaths

Dr. John A. McDonald, Century, aged 58, died in December.

Dr. Frank Waters Hains, Sebring, aged 59, died December 30 at Key West.

GEORGIA

Bibb County Medical Society has elected Dr. Herring Winship, President; Dr. O. S. Spivey, Vice-President; Dr. Fred Adams, Secretary-Treasurer.

Chatham County Medical Society has elected Dr. R. V. Martin, Savannah, President; Dr. S. Usher, Savannah, Vice-President; Dr. E. C. Demmond, Secretary-Treasurer.

Randolph County Medical Society has elected Dr. H. R. Ingram, Coleman, President; Dr. Loren Gary, Georgetown, Vice-President; Dr. G. Y. Moore, Cuthbert, Secretary-Treasurer.

Stewart-Webster Counties Medical Society has elected Dr. G. G. Lunsford, Weston, President; Dr. J. H. Foster, Preston, Vice-President; Dr. M. Walton, Lumpkin, Secretary-Treasurer.

Tri-County Medical Society has elected Dr. J. L. Cheshire, Damascus, President; Dr. W. C. Hays, Colquitt, Vice-President; Dr. C. K. Sharp, Arlington, Secretary-Treasurer.

Ware County Medical Society has elected Dr. D. M. Bradley, Waycross, President; Dr. K. McCullough, Waycross, Vice-President; Dr. J. E. Penland, Waycross, Secretary-Treasurer.

The following officers have been named for the King's Daughters' Hospital, Waycross: Dr. Raymond L. Johnson, President; Dr. D. M. Bradley, Vice-President; Dr. G. N. MacDonell, Secretary.

The Sixth District Medical Society has elected Dr. A. R. Rozar, Macon, President; Dr. R. C. Goolsby, Jr., Forsyth, Vice-President.

Congress has appropriated $275,000 for the erection of Benning Hospital, Columbus, work on which has already been started.

The Abner Wellborn Calhoun Medical Library, dedicated as a memorial to the late Dr. Calhoun, Atlanta, who died in 1910, has been opened at Wesley Memorial Hospital. Dr. Ferdinand Phinizy Calhoun, son of the deceased physician, presented to the Board of Directors of Emory University the library, which contains 5000 volumes.

Drs. F. D. and J. C. Patterson have purchased a new home for the Patterson Hospital, Cuthbert.

A hospital to be known as the John D. Archbold Memorial Hospital is being erected at Thomasville by J. F. Archbold in honor of his father. Colonel James L. Bevans, Washington, D. C., who recently retired from the medical corps of the army, has been appointed Superintendent.

Dr. Eugene B. Elder, former head of the Macon City Hospital, Macon, has been appointed Superintendent of the

(Continued on page 36)

VESTAL ROSES

Roses add so much to a home — elegance, beauty, love, contentment, happiness. Vestal roses are superior in form, vitality and loveliness. **Our Roses specialty for 60 years.**

Send for Free Guide!

Our spring guide contains valuable information regarding rose culture. Lists hundreds of varieties; also other plants, fruits and berries. More than a catalog—a valuable reference book. **It's free!**

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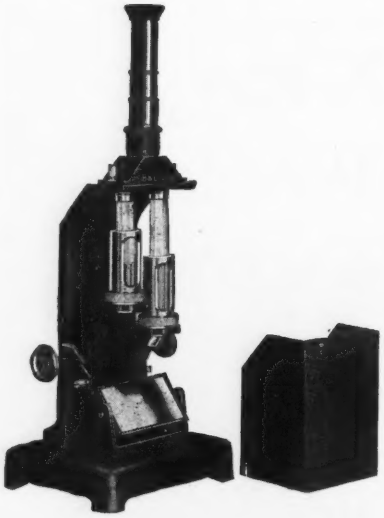

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Laboratories in the South will find it profitable to purchase their supplies from us, because of the saving in transportation charges and the dispatch with which their orders can be filled. Our location assures this. "Let us show you what service we can render you."

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Surgical Instruments, Hospital, X-Ray and Laboratory Supplies,
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(Continued from page 34)

Georgia Baptist Hospital, Atlanta, succeeding Dr. W. B. Summerall.

The late Mr. James N. Renfroe, Atlanta, left $10,000 to the Wesley Memorial Hospital in honor of his mother, Mrs. Sarah E. Renfroe.

Dr. Bernard Leonidas Shackleford, Atlanta, and Miss Winnifred Madden, Concord, were married December 25.

Deaths

Dr. John Lindsey Durham, Woodville, aged 70, died December 24.

Dr. Joseph E. Lee, Thomasville, aged 55, died suddenly December 13 from heart disease.

Dr. George L. Chapman, Milledgeville, aged 48, died December 26 from pneumonia.

Dr. A. C. Moreland, Forsyth, died December 5.

Dr. Joseph A. Groves, Atlanta, aged 93, died November 26.

KENTUCKY

Barren County Medical Society has elected Dr. C. W. Froedge, President; Dr. W. M. Ewing, Vice-President; Dr. C. C. Turner, re-elected Secretary.

Boyd County Medical Society has elected Dr. W. O. Eaton, President; Dr. H. G. Stambaugh, Vice-President; Dr. L. H. Winans, Secretary; Dr. E. R. Fitch, Treasurer.

Calloway County Medical Society has elected Dr. E. B. Houston, President; Dr. J. A. Outland, Vice-President; Dr. P. A. Hart, Secretary-Treasurer.

Carlisle County Medical Society has elected Dr. G. W. Payne, Bardwell, President; Dr. H. A. Gilliam, Milburn, Vice-President; Dr. R. C. Burrow, Cunningham, Secretary; Dr. T. J. Marshall, Bardwell, Treasurer.

Green County Medical Society has elected Dr. S. J. Simmons, President; Dr. J. C. Graham, Vice-President; Dr. O. H. Shively, Secretary.

Johnson County Medical Society has elected Dr. G. V. Daniel, President; Dr. E. E. Archer, Vice-President; Dr. D. H. Daniel, Secretary; Dr. P. B. Hall, Treasurer.

Perry County Medical Society has elected Dr. H. W. Gingles, President; Dr. J. W. Scudder, Vice-President; Dr. J. P. Boggs, Secretary-Treasurer.

Dr. Jacob N. Bailey has been elected Mayor of Paducah.

Deaths

Dr. Lewis Samuel McMurtry, Louisville, aged 74, died suddenly at his home on February 1 from pneumonia.

Dr. William Dunn Powell, Hopkinsville, aged 64, died January 5 from valvular heart disease.

Dr. Percy Kendall Holmes, Lexington, aged 44, died January 8 following a long illness.

Dr. C. S. Brice, Flemingsburg, aged 64, died January 9 from cerebral hemorrhage.

Dr. Porter Campbell Layne, Ashland, aged 53, died suddenly January 13.

Dr. Samuel L. Henry, Morganfield, aged 70, died recently from heart disease.

Dr. Edward L. Stuard, Covington, aged 80, died January 8 from senility.

LOUISIANA

Ouachita Parish Medical Society has elected Dr. D. I. Hirsch, Monroe, President; Dr. A. L. Peters, Secretary.

St. Tammany Parish Medical Society has elected Dr. J. K. Griffith, President; Dr. G. R. Pennington, Vice-President; Dr. W. R. Singleton, Secretary-Treasurer.

Webster Parish Medical Society has elected Dr. W. McDade, Minden, President; Dr. J. D. Kilgore, Minden, Vice-President; Dr. C. M. Baker, Minden, Secretary-Treasurer.

A new branch quarantine station was opened January 1 on the west bank of the Mississippi River, directly across from Violet. All ships except those coming from infected ports will be permitted to proceed directly to Violet, twelve miles below New Orleans, instead of going to the Federal quarantine station, which is ninety miles down the river.

Mrs. Maurice Stern has given $12,000 to the Tulane University School of Medicine, New Orleans, as a memorial to her husband. It is to be known as the Maurice Stern Fund for Medical Literature. The income from this will be used to purchase medical periodicals for the school library and for medical books selected by the faculty.

Dr. G. M. Brandau is in charge of the Beauregard Parish Unit.

Dr. Edmund L. Leckert, Secretary-Treasurer and Sanitary Officer of the Board of Health, New Orleans, has been appointed Superintendent of the Board to succeed the late Dr. John Callan.

(Continued on page 38)

Prescribing a Milk Formula for the Underweight Baby

TEST after test, made by physicians of eminent authority, has proved that the underweight, mal-nourished infant who fails to respond properly to any feeding formula will show an immediate improvement if the milk is "gelatinized" as follows:

Soak one level tablespoonful of Knox Sparkling Gelatine in ½ cup cold milk, from the baby's formula, for ten minutes; cover while soaking; then place the cup in boiling water, stirring until gelatine is fully dissolved; add this dissolved gelatine to the quart of cold milk or regular formula.

Pure, granulated gelatine (Knox)[1] is a highly protective colloid; as an adjunct to milk, it prevents excessive curding in the infant stomach, thus promoting its thorough digestion;[2] it facilitates complete absorption of all the milk nutriment;[3] and it prevents milk-colic, regurgitation, and diarrhea.[4]

Plain, edible gelatine also furnishes, to the extent of 5.9%, the natural amino-acid, lysine, which is so essential to human growth. This makes it an invaluable element in the diet of growing children.

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(1) *Z. Zsigmondy—Anal. Chem.* 40 (190), 697; *Beitr. Physiol. Path. Chem. No.* 3 (1903), 137.
(2) *Drs. Moore and Krombholz, J. Physiol.*, 22 (1908), 54.
(3) *Dr. C. A. Herter ("Infantilism from Chronic Intestinal Infection").*
(4) *Dr. Abraham Jacobi ("The Intestinal Diseases of Infancy and Early Childhood").*

(Continued from page 36)

Members of the junior medical class of Tulane University, New Orleans, have formed the Tulane Undergraduate Association in order to create interest in historical medicine among advanced students.

Dr. A. W. Brennam has been appointed Health Director of Tanhipahoa Parish.

MARYLAND

Baltimore County Medical Society has elected Dr. William A. Bridges, Towson, President; Dr. Robert H. Riley, Catonsville, Vice-President; Dr. William R. Dunton, Jr., Govans, Secretary.

Officers, directors, agents and employees of the United States Fidelity and Guaranty Company have donated $40,000 to found a free dispensary at the Union Memorial Hospital. This to perpetuate the memory of John R. Bland.

An old building of the Maryland General Hospital will be remodeled at a cost of $50,000. The capacity of the hospital will be increased from 170 patients to 250.

The Baltimore City Health Department, directed by Dr. V. L. Ellicott, epidemiologist, will start campaigns to reduce tuberculosis among negroes.

It has been announced that Mrs. Lucy Wortham James, New York, gave $400,000 for the women's clinic at Johns Hopkins Hospital, Baltimore, which was recently dedicated. Dr. J. Whitridge Williams, Chief of the Department of Obstetrics, and Dr. Thomas H. Cullen, Chief of the Department of Gynecology, will be in charge.

The State Department of Health, in cooperation with the State Tuberculosis Association, has opened tuberculosis clinics in every county in the State. Dr. John M. Nicklas, Baltimore, is in charge of the clinics.

Ground has been broken for the third unit of the Children's Hospital School, Baltimore, which will have 100 beds.

Recently the Health Department of Baltimore condemned 32,000 cans of condensed milk found in one wholesale grocery house and 7000 cans of fruit, vegetables and fish were condemned in another.

Dr. Elmer C. Kefauver, Thurmont, has been appointed Full-time Health Officer of Frederick County.

Dr. George R. Cousar has sailed for the Belgian Congo, Africa, to take up medical missionary work. He will be stationed at Luebo.

Dr. H. D. McCarty has resigned as Physician-in-Charge of the Tuberculosis Hospital, Bay View. He will continue with the Department of Supervisors of City Charities and will take charge of the dispensary service with headquarters at Baltimore.

Dr. Anthony V. Buchness, Assistant Resident Surgeon at Bay View Hospital, has resigned. He will be succeeded by Dr. Ira P. Champe.

Deaths

Dr. Charles Church Harris, Baltimore, died January 11 from pneumonia.

Dr. Martin W. Goldsborough, Cambridge, aged 53, died January 11 from cerebral hemorrhage.

MISSISSIPPI

Dr. Waller S. Leathers, Jackson, State Health Officer, has been appointed a member of the National Board of Medical Examiners.

Deaths

Dr. George Thomas Darden, Blanton, aged 65, died in December.

Dr. William Green Abernethy, Woodland, aged 42, died December 6 from chronic nephritis.

Dr. Frank W. Henington, Terry, aged 58, was found dead in bed December 22 from heart disease.

Dr. George W. Luster, Edwards, aged 61, died December 13.

Dr. Lemuel Sledge Allen, Indianola, aged 46, died December 28.

Dr. Thomas G. Ivy, West Point, aged 73, died January 9 from senility.

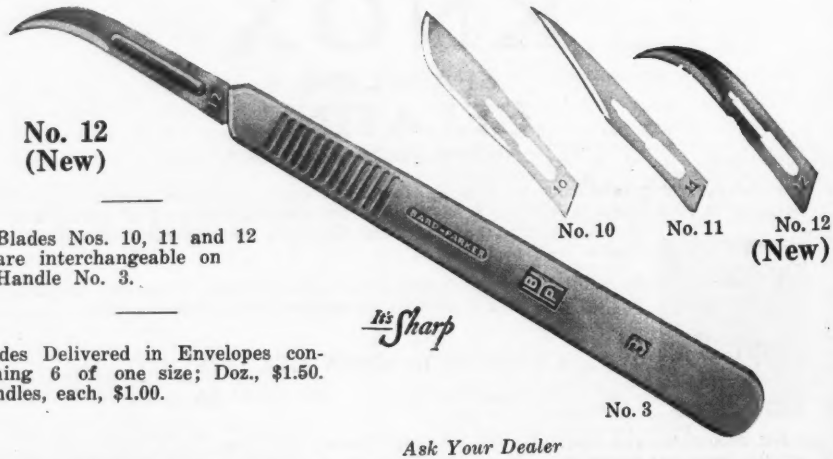
MISSOURI

At the recent meeting of the State Board of Health at Jefferson City, all the present officers were re-elected as follows: Dr. Emmett P. North, St. Louis, President; Dr. Rudolph S. Vitt, St. Louis, Vice-President; Dr. Cortez F. Enloe, Jefferson City, Secretary.

The Board of Aldermen of St. Louis is considering an ordinance authorizing the Hospital Commissioner to charge patients at the City Hospital $2.20 a day when the patients are able to pay.

(Continued on page 40)

It's Sharp BARD-PARKER KNIFE It's Sharp



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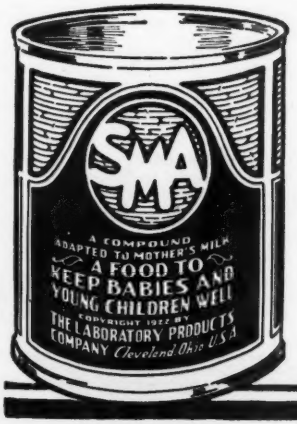
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Prevents rickets and spasmophilia. Promotes normal growth and development.

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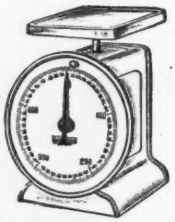

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BIRMINGHAM, ALA.

(Continued from page 38)

The Medical Credit Bureau was recently incorporated under the laws of Missouri in St. Louis with a capital of $110,000. There is a membership of 740. The purpose of the Bureau is to collect physicians', dentists', druggists' and hospitals' bad debts for fees commensurate with the best service. Money will be loaned to enable patients to pay promptly their medical, dental, drug or hospital bills. Dr. John C. Morfit is President of the Board of Directors and Dr. Noxon Toomey, Secretary.

Dr. Martin F. Engman, St. Louis, has been elected a corresponding member of the Danish Dermatological Association and of the French Society of Dermatology and Syphilology.

Dr. David Preswick Barr, Cornell University, has been appointed Busch Professor of Medicine in Washington University Medical School and Physician-in-Chief to the Barnes Hospital. He will assume active duties in September.

The General Education Board has appropriated an endowment of $650,000 to the St. Louis Maternity Hospital. The donation is contingent upon the erection of a new building for the Hospital to cost $500,000 to be paid for by subscriptions from other sources.

Dr. Paul V. Woolley, Police Surgeon, Kansas City, has been appointed Chief of Police to succeed C. A. Vassar.

Dr. Glover Hancock Copher and Miss Edith Marjorie Hulsizer, both of St. Louis, were married January 12.

Deaths

Dr. Harry D. McQuade, Kansas City, aged 67, died January 9 from pneumonia.

Dr. George Elgin Prewitt, Wellsville, aged 60, died January 11 from heart disease.

Dr. Robert E. Donnell, DeSoto, aged 46, died October 15 at St. Luke's Hospital, St. Louis, from appendicitis.

Dr. Charles F. Blank, St. Louis, aged 58, died December 26 from diabetes mellitus.

Dr. Benjamin Murray Hypes, St. Louis, aged 77, died January 15 from heart disease.

Dr. Eva G. Condon, St. Louis, aged 72, died Novembber 9.

Dr. Albert R. Black, Kahoka, aged 73, died January 3 from heart disease.

Dr. John A. Postlewait, Tarkio, aged 73, died December 3.

Dr. Levi Marquis Asbury, Lexington, aged 58, died in December at a hospital in Kansas City.

Dr. Joseph Wilson Dean, Pond, aged 48, died January 5 from pneumonia following an appendectomy.

Dr. Emily Sibley Colt, Mount Washington, aged 84, died January 1 from pneumonia.

NORTH CAROLINA

Buncombe County Medical Society has elected Dr. L. W. Elias, Asheville, President; Dr. C. C. Orr, Asheville, Vice-President; Dr. R. A. White, Asheville, Secretary-Treasurer.

Mecklenburg County Medical Society has elected Dr. J. Q. Myers, President; Dr. S. M. Henderson, Vice-President; Dr. John P. Kennedy, Secretary-Treasurer.

Randolph County Medical Society has elected Dr. C. C. Hubbard, Farmer, President; Dr. W. J. Moore, Asheboro, Vice-President; Dr. W. L. Lambert, Asheboro, Secretary-Treasurer.

Dr. Lewis B. McBrayer has resigned as Superintendent of the North Carolina Sanatorium for the Treatment of Tuberculosis, Sanatorium. Dr. Paul P. McCain, formerly Assistant Superintendent, will succeed him.

Dr. Alonzo H. Myers and Miss Eleanor Grace Gurney, both of Charlotte, were married in New York December 17.

Deaths

Dr. John Orville Hooper, Saluda, aged 42, died January 5 from pneumonia.

OKLAHOMA

Adair County Medical Society has elected Dr. Dorsey P. Chambers, Stilwell, President; Dr. Robert M. Church, Stilwell, Secretary-Treasurer.

Bryan County Medical Society has elected Dr. C. F. Taliaferro, Bennington, President; Dr. H. B. McKinney, Durant, Vice-President; Dr. John A. Haynie, Durant, Secretary-Treasurer.

Caddo County Medical Society has elected Dr. C. N. Meador, Anadarko, President; Dr. E. L. Inman, Apache, Vice-President; Dr. Charles R. Hume, Anadarko, Secretary-Treasurer.

Canadian County Medical Society has elected Dr. W. J. Muzzy, El Reno, President; Dr. C. M. Pierce, Vice-President; Dr. James T. Riley, El Reno, Secretary-Treasurer.

Carter County Medical Society has elected Dr. C. A. John-

(Continued on page 42)

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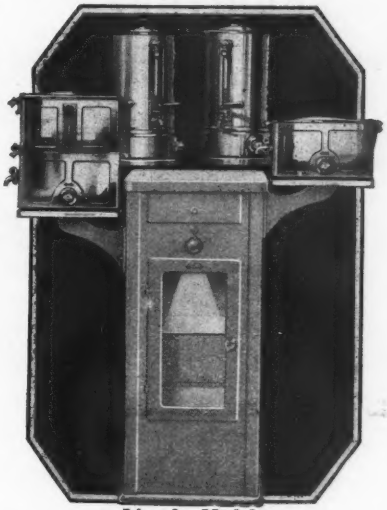

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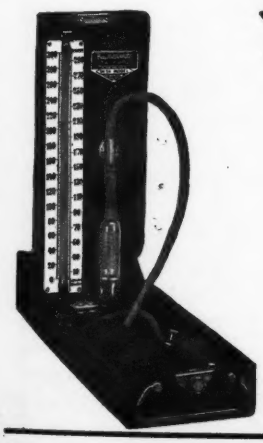

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(Continued from page 40)

son, Wilson, President; Dr. Walter M. Johnson, Ardmore, Vice-President; Dr. S. DePorte, Ardmore, Secretary-Treasurer.

Cherokee County Medical Society has elected Dr. W. G. Blake, Tahlequah, President; Dr. P. H. Medearis, Tahlequah, Vice-President; Dr. Joseph M. Thompson, Tahlequah, Secretary-Treasurer.

Comanche County Medical Society has elected Dr. W. J. Mason, Lawton, President; Dr. L. C. Knee, Lawton, Vice-President; Dr. Thos. R. Lutner, Lawton, Secretary-Treasurer.

Craig County Medical Society has elected Dr. F. M. Adams, Vinita, President; Drs. Wm. Campbell, Vinita, and C. F. Walker, Grove, Vice-Presidents; Dr. C. S. Neer, Vinita, Secretary-Treasurer.

Cushing County Medical Society has elected Dr. H. C. Manning, Cushing, Vice-President, to succeed Dr. J. V. Blair, who has removed to Burkburnett.

Custer County Medical Society has elected Dr. W. I. Basinger, Butler, President; Dr. C. H. McBurney, Clinton, Secretary-Treasurer.

Garfield County Medical Society has elected Dr. John R. Walker, Enid, President; Dr. A. E. Wilkins, Covington, Vice-President; Dr. D. D. Roberts, Enid, Secretary-Treasurer.

Garvin County Medical Society has elected Dr. C. M. Pratt, Lindsay, President; Dr. H. P. Markham, Paul's Valley, Vice-President; Dr. J. W. Stephens, Paul's Valley, Secretary-Treasurer.

Grady County Medical Society has elected Dr. A. W. Nunnery, Chickasha, President; Dr. U. C. Boone, Chickasha, First Vice-President; Dr. J. F. Renegar, Tuttle, Second Vice-President; Dr. D. S. Downey, Chickasha, Secretary-Treasurer.

Grant County Medical Society has elected Dr. I. V. Hardy, Medford, President; Dr. S. A. Lively, Wakita, Vice-President; Dr. Charles A. Brake, Medford, Secretary-Treasurer.

Jefferson County Medical Society has elected Dr. M. L. Hutchison, Ryan, President; Dr. J. W. Watson, Ryan, Secretary-Treasurer.

LeFlore County Medical Society has elected Dr. Harrell Hardy, Poteau, President; Dr. G. R. Booth, Leflore, Vice-President; Dr. Earl Woodson, Poteau, Secretary-Treasurer.

Murray County Medical Society has elected Dr. J. T. Wharton, Sulphur, President; Dr. Howson C. Bailey, Sulphur, Secretary-Treasurer.

McCurtain County Medical Society has elected Dr. A. S. Graydon, Idabell, President; Dr. R. H. Sherrill, Broken Bow, Secretary-Treasurer.

Nowata County Medical Society has elected Dr. J. P. Sudderth, Nowata, President; Dr. John R. Collins, Nowata, Secretary-Treasurer.

Okfuskee County Medical Society has elected Dr. C. M. Bloss, President; Dr. A. J. Stephenson, Vice-President; Dr. R. Keyes, Secretary-Treasurer.

Oklahoma County Medical Society has elected Dr. William H. Bailey, Oklahoma City, President; Dr. W. A. Lackey, Oklahoma City, Vice-President; Dr. E. Lee Jones, Oklahoma City, Secretary-Treasurer.

Okmulgee County Medical Society has elected Dr. J. L. Miner, Beggs, President; Dr. J. H. Neal, Beggs, Vice-President; Dr. W. W. Stark, Okmulgee, Secretary-Treasurer.

Rogers County Medical Society has elected Dr. W. F. Hayes, Claremore, President; Dr. Caroline Bassman, Claremore, Vice-President; Dr. Melvin T. Means, Claremore, Secretary-Treasurer.

Stephens County Medical Society has elected Dr. J. B. Carmichael, Duncan, President; Dr. J. W. Nieweg, Duncan, Secretary-Treasurer.

Tillman County Medical Society has elected Dr. Curtis Allen, Hollister, President; Dr. J. C. Reynolds, Frederick, Vice-President; Dr. J. Angus Gillis, Frederick, Secretary-Treasurer.

Texas County Medical Society has elected Dr. William H. Langston, Guymon, President; Dr. R. B. Hayes, Guymon, Secretary.

Washita County Medical Society has elected Dr. E. F. Stevens, Foss, President; Dr. A. M. Sherburne, Cordell, Vice-President; Dr. B. W. Baker, Cordell, Secretary-Treasurer.

Woodward County Medical Society has elected Dr. C. J. Forney, Woodward, President; Dr. T. C. Leachman, Woodward, Vice-President; Dr. C. W. Tedrowe, Woodward, Secretary-Treasurer.

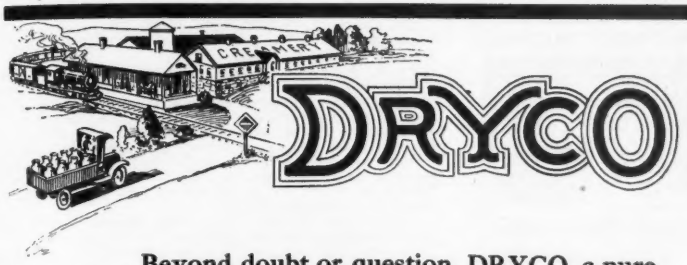
The $130,000 Municipal Hospital, Muskogee, has been opened. It has accommodations for sixty patients.

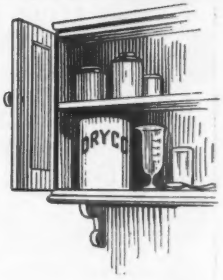
Payne County Medical Society is supplying the city libraries of Cushing and Stillwater with Hygeia for 1924.

Dr. J. Arthur Mullins, Marlow, has been appointed Physician for the Rock Island Railroad.

Dr. A. S. Nuckolls, Ponca City, has been elected head of the Ponca City Hospital staff.

(Continued on page 44)





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(Continued from page 42)

Dr. James W. Scarborough, Gould, has been appointed Superintendent of the Narcotic Hospital at Darlington. He succeeds Dr. J. W. Henry.

Dr. A. J. Weedn, Duncan, who has hospitals at Duncan and Marlow, is also installing hospital facilities at Waurika.

The Cushing Municipal Hospital is operating as an open hospital to all reputable physicians and surgeons.

Dr. V. C. Tisdal, Elk City, is planning to build a new hospital which will be capable of taking care of 75 patients.

Plans are being made to double the capacity of the Oklahoma State Baptist Hospital, Oklahoma City, which will be known in future as the Oklahoma City General Hospital. Dr. J. E. Harbison is in charge.

Dr. Carl Puckett, Pryor, has been appointed State Health Commissioner to succeed Dr. Albert E. Davenport.

Dr. Buric N. Smith, Tulsa, and Miss Ruth Alice Ward, Ardmore, were married January 15.

Dr. Henry S. Browne, Tulsa, and Miss Dorothy A. Malone, St. Louis, Mo., were married December 31.

Deaths

Dr. Alexander Barnett Baird, Oklahoma City, aged 65, died December 19.

Dr. Benjamin Jesse Plunkett, Duncan, aged 56, died January 11.

Dr. Marion Washington Buchanan, Watonga, aged 47, died January 5.

Dr. James H. Proffitt, Yale, aged 52, died January 19 from tuberculosis.

Dr. George Arthur Boyle, Enid, aged 66, died December 31.

SOUTH CAROLINA

Anderson County Medical Society has elected Dr. G. S. Clinkscales, President; Dr. J. O. Sanders, Vice-President; Dr. Lee W. Milford, Secretary-Treasurer.

Chester County Medical Society has elected Dr. J. B. McKeown, Great Falls, President; Dr. J. P. Young, Chester, Vice-President; Dr. W. J. Henry, Chester, Secretary-Treasurer.

Oconee County Medical Society has elected Dr. W. C. Mayes, Fair Play, President; Dr. J. D. Verner, Walhalla, Vice-President; Dr. E. A. Hines, Seneca, Secretary-Treasurer.

Dr. John J. Post, Darlington, Health Officer of Darlington County, has resigned.

Dr. Arthur D. Burnett, Health Officer of Greenwood, has resigned.

Deaths

Dr. James William Williamson, Hartsville, aged 64, died suddenly January 11.

TENNESSEE

Campbell County Medical Society has elected Dr. S. D. Queener, Jacksboro, President; Dr. G. B. Brown, Elk Valley, Vice-President; Dr. F. M. McClintock, Newcomb, Secretary-Treasurer.

Dyer County Medical Society has elected Dr. J. P. Baird, Dyersburg, President; Dr. J. W. Wynne, Newbern, Vice-President; Dr. R. L. Motley, Dyersburg, Secretary.

Hamblen County Medical Society has elected Dr. S. M. Ryburn, President; Dr. F. F. Painter, Vice-President; Dr. C. T. Carroll, Secretary.

Henderson County Medical Society has elected Dr. C. H. Johnston, Lexington, President; Drs. J. M. Arnold, Lexington, and C. E. Bolen, Wildersville, Vice-Presidents; Dr. J. E. Powers, Lexington, Secretary-Treasurer.

Knox County Medical Society has elected Dr. R. H. Newman, Knoxville, President; Dr. Robert Reaves, Knoxville, Vice-President; Dr. Jesse C. Hill, Bearden, Secretary-Treasurer.

Memphis and Shelby County Medical Society has elected Dr. W. F. Clary, President; Dr. Casa Collier, Vice-President; Dr. A. F. Cooper, Secretary; Dr. T. N. Coppedge, Treasurer.

Nashville Academy of Medicine and Davidson County Medical Society has elected Dr. R. O. Tucker, Nashville, President; Dr. W. B. Anderson, Vice-President; Dr. Robert R. Brown, Secretary-Treasurer.

Roane County Medical Society has elected Dr. W. E. Gallion, Oakdale, President; Dr. T. L. Smith, Rockwood, Vice-President; Dr. W. W. Hill, Harriman, Secretary-Treasurer.

Rutherford County Medical Society has elected Dr. J. F. Adams, Bradyville, President; Dr. V. S. Campbell, Murfreesboro, Vice-President; Dr. J. A. Scott, Murfreesboro, Secretary-Treasurer.

(Continued on page 46)

ACME-INTERNATIONAL HIGH FREQUENCY GENERATOR

An Announcement

The Acme-International X-Ray Co. submits its New High Frequency Generator for the approval of the physio-therapist, and is in position at the present time to accept orders for March and April delivery.

The same engineering staff responsible for the design of the highly successful Precision Type Coronaless X-Ray apparatus has spent its best efforts in producing an apparatus capable of efficient performance in the various high frequency modalities.

In addition to the general refinement of construction throughout the apparatus several exclusive features incorporated in the design will attract the interest of the physio-therapist.

The ten point spark gap of new and improved design combined with a ten point reactance switch furnishes unusual flexibility and convenience in operation. The construction of this mechanism embodying a method of cooling by natural draft and a large radiating surface, and also eliminating the use of insulating material subject to carbonization thru heat assures the operator of the continuous use of his apparatus at its fullest efficiency.

Both Oudin and D'Arsonval currents of any desired intensity are available for the finest desiccation to the heaviest surgical coagulation work. Auto condensation is possible and sufficient output is available to give all the heat desired for all classes of diathermy.

ACME-INTERNATIONAL X-RAY CO.

341-351 West Chicago Avenue, Chicago, Illinois

Exclusive Manufacturers of Precision Type Coronaless Apparatus

Calcreose

In Bronchitis and Tuberculosis

CALCREOSE is particularly suitable as an adjunct to other remedial measures.

CALCREOSE contains in loose chemical combination approximately equal parts of creosote and calcium hydrate.

CALCREOSE has all the pharmacological activity of creosote but apparently does not cause any untoward effect on the gastro-intestinal tract, therefore Calcreose may be taken in comparatively large doses for long periods of time.

Price:—Powder, lb., $3.00 (Solution prepared by adding 1 gallon water). Tablets: 1,000, $3.00; 500, $1.60; 100, 40c.

Samples (Tablets) and Literature Free

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NEWARK, N. J.

NEOSALVARSAN

"The Dependable Original"

Our obligation of responsible helpfulness towards practitioner and patient is being fulfilled through the medium of lowered prices of Neosalvarsan made possible by quantity productions.

Dosage	I, 0.15 gram	$ .60	per	ampule
"	II, 0.3 "	.65	"	"
"	III, 0.45 "	.70	"	"
"	IV, 0.6 "	.80	"	"
"	V, 0.75 "	.90	"	"
"	VI, 0.9 "	1.00	"	"

Neosalvarsan, the dependable original, is unsurpassed in low toxicity and is unequalled in therapeutic effectiveness. These facts have been demonstrated through extensive use during the past thirteen years and constitute a unique record.

H·A·METZ LABORATORIES, INC
122 HUDSON ST. NEW YORK

(Continued from page 44)

Smith County Medical Society has elected Dr. J. G. Bridges, Gordonsville, President; Dr. R. E. Garrett, Dixon Springs, Vice-President; Dr. B. J. High, Secretary-Treasurer.

Sullivan-Carter-Johnson County Medical Society has elected Dr. C. W. Fleming, Holston Valley, President; Dr. W. W. Vaught, Vice-President from Johnson County; Dr. N. D. Robinson, Vice-President from Carter County; Dr. E. W. Tipton, Vice-President from Sullivan County; Dr. Nat Copenhaven, Bristol, Secretary-Treasurer.

White County Medical Society has elected Dr. E. B. Clark, Eastland, President; Dr. W. M. Johnson, Sparta, Vice-President; Dr. A. F. Richards, Sparta, Secretary.

Dr. J. J. Durrett, who resigned as Superintendent of the City Health Department, Memphis, has reconsidered and will continue his work as heretofore.

Dr. Willis C. Campbell, Memphis, and Dr. H. M. Tigert, Nashville, at the recent meeting of the Southern Surgical Association at White Sulphur Springs, were elected to membership.

The Memphis Medical Journal, official organ of the Memphis and Shelby Medical Society, appeared in January, as its first issue. It will be a monthly publication. Dr. J. A. McIntosh, Jr., is Editor and Drs. J. A. Crisler, C. H. Sanford, H. C. Schmeisser, Frank W. Smythe, James B. Stanford and N. S. Stern are Associate Editors.

The National Committee for Mental Hygiene, New York, after a careful survey, has decided upon Memphis out of twenty-six other cities for the establishment of the next Child Guidance Clinic. Fifteen thousand dollars is suggested as a minimum budget on which to start this clinic.

Dr. Herbert Acuff, Knoxville, has been selected to examine applicants for civil service.

Dr. Harry S. Mustard, Charleston, S. C., has been appointed Director of the Rutherford County Child Health Demonstration Unit.

Lieut. R. H. Snowden and Lieut. R. W. Wimberly have been ordered to Nashville by the Secretary of the Navy to physically examine all students of medical colleges in Tennessee who desire to enter the Medical Corps of the U. S. Navy.

(Continued on page 48)

Laboratories of

Drs. Bunce, Landham and Klugh

ATLANTA, GEORGIA

DEPARTMENTS

PATHOLOGY	BACTERIOLOGY and SEROLOGY	X-RAY and RADIUM
Allen H. Bunce, A.B., M.D., F.A.C.P.	George F. Klugh, B.S., M.D.	Jackson W. Landham, M.D.

These laboratories are equipped for making every test of clinical value in the diagnostic study of medical and surgical cases. Only standardized methods and technique are used.

In addition to the diagnostic study of cases there are adequate facilities for the x-ray and radium treatment of conditions in which these forms of treatment are indicated.

Fee lists and containers for pathological specimens and information in reference to x-ray and radium work furnished upon request.

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POWDERED WHOLE MILK

	Dry	Liquid *
BUTTERFAT	28.00%	3.33%
CASEIN	21.28%	2.53%
ALBUMIN	5.46%	.65%
LACTOSE	38.00%	4.53%
ASH	5.76%	.69%
WATER	1.50%	88.27%
CALORIES (per ounce)	149	18.

* 4½ Ounces to a quart of water

KLIM is completely soluble in water of any temperature

When Used in Infant Feeding

Reduced to normal strength KLIM has the same analysis and caloric value as natural whole cow's milk and is subject to the same modifications when used in infant feeding

Recognizing the importance of scientific control, all contact with the laity is predicated on the policy that KLIM may be used in infant feeding only according to a physician's formula. Pharmacies obtain KLIM direct from the Merrell-Soule Co. or through eight conveniently located territorial distributors. If not available to your patients we will supply your pharmacist upon your recommendation.

The nutritive properties of natural cow's milk are retained in KLIM

MILK atomized into filtered air sufficiently warm to cause instantaneous evaporation of the water—is KLIM.

The rapid evaporation of the water so cools the milk particles as to prevent over heating—evidenced by the fact that in KLIM

The albumin is not coagulated

The lactose is not caramelized

The vitaminic potency is not diminished (see Dutcher and Cavanaugh — June, 1923, ed. American Journal Diseases of Children).

The enzymic reactions are normal

The powder is completely soluble

Given, also, simplicity of preparation, absolute safety and superior digestibility, the physician has at his command a worthy substitute when breast milk is insufficient.

Literature and samples sent upon request.

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In the minds of many physicians the use of Radium is associated only with the treatment of malignant disease, but actually its use in non-malignant conditions forms a broader field of usefulness.

Good results are being reported with radium in such conditions as inoperable toxic goiter, certain types of uterine fibroids, uterine hemorrhage, tubercular adenitis, and many types of subacute and chronic skin lesions.

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NEW YORK BOSTON DALLAS CHICAGO

To sustain the heart

Digitan

A *Physiologically* standardized
Preparation of Digitannoids

Ampuls, for injection, 1 Cc., boxes of 6
Powder: In vials of ⅛ oz.
Tablets: 1⅕ grains, tubes of 12
Oral Solution:
(Special Tincture) Vials of 12 Cc.

Merck & Co.
45 Park Place New York

(Continued from page 46)

Dr. E. R. Hochstetter, Chattanooga, has been elected County Physician of Hamilton County.

Miss Winifred W. Atkinson, St. Luke's Hospital, Utica, N. Y., has been appointed Superintendent of Nurses, Memphis General Hospital, Memphis.

Dr. G. M. Herrell has been re-elected County Physician of Knox County.

Physicians and laymen of Memphis held a joint meeting in January under the auspices of the Chamber of Commerce for the purpose of creating favorable sentiment in stimulating the Legislature to divert some unused funds in another department to the Department of Health. The State Board of Health receives $70,000 and they are seeking $200,000 to cover its program at the present time.

Dr. Henry G. Rudner, Memphis, has purchased a two-story frame house on Madison Avenue and will expend approximately $20,000 in remodeling it. He will use the building for his private offices and a medical clinic.

Dr. Russell B. Kilpatrick and Mrs. Alice R. Carpenter, both of Memphis, were married January 17.

Dr. Henry Cone Magee, Nashville, and Miss Agnes Adele Tomes, New Orleans, La., were married December 19.

Deaths

Dr. Jarrott C. Flowers, Lyles, aged 57, died December 20.

Dr. Samuel Webb White, Franklin, aged 45, died December 29 at St. Thomas Hospital, Nashville, from acute prostatitis.

Dr. John Calhoun Balthrop, Newbern, aged 65, died recently.

Dr. Arsey Womack, McMinnville, aged 72, died December 15 from nephritis following a fracture of the hip.

Dr. D. R. Gist, Sparta, aged 70, died December 12 from carcinoma.

TEXAS

Bosque County Medical Society has elected Dr. J. H. Burnett, Kopperl, President; Dr. Fred W. Standefer, Valley Mills, Secretary.

Bowie County Medical Society has elected Dr. W. E. Womack, Redwater, President; Drs. C. A. Smith and G. A. Hays,

(Continued on page 50)

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Let Us Send
a package to try

You'll find it a dish to advise.

Pettijohn's is a special wheat—the most flavory wheat that grows. Each enticing flake hides 25% of bran.

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Dr. Summerall has had a vast experience in hospital management, both civil and military—the past fourteen years in the hospitals of Atlanta.

His knowledge as to hospital construction, arrangement, equipment, furnishings, administration, purchasing, etc., would undoubtedly be advantageous to many of the institutions which we serve.

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In action similar to resorcin, but with increased therapeutic effectiveness. Itself a liquid, Euresol readily penetrates the skin, exerting a deeper action that is mild and more permanent. It causes no irritation and has practically no effect on the color or the feel of the hair.

Euresol, or the perfumed Euresol "pro Capillas", is to be used in either 2 to 5% alcoholic solution as scalp wash or as 5 to 50% salves or paints.

Literature, formulae and samples upon request

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1105 Tower Building, 6 N. Michigan Ave.

Telephones: Randolph 6897-6898 **William L. Brown, Managing Director**

CHICAGO, ILL.

(Continued from page 48)

Texarkana, Vice-Presidents; Dr. J. T. Robison, Texarkana, Secretary-Treasurer.

Cameron County Medical Society has elected Dr. H. K. Loew, Brownsville, President; Dr. C. M. Cash, San Benito, Vice-President; Dr. John Hunter, La Feria, Secretary-Treasurer.

Camp County Medical Society has elected Dr. J. K. Bates, Pittsburg, President; Dr. J. H. Mitchell, Pittsburg, Vice-President; Dr. Robert Y. Lacy, Pittsburg, Secretary-Treasurer.

Cooke County Medical Society has elected Dr. W. J. Price, Gainesville, President; Dr. W. N. Kelley, Valley View, Vice-President; Dr. R. C. Whiddon, Gainesville, Secretary.

Dallas County Medical Society has elected Dr. F. A. Pierce, President; Dr. W. D. Jones, Vice-President; Dr. W. W. Fowler, re-elected Secretary.

Falls County Medical Society has elected Dr. O. T. Bundy, Marlin, President; Dr. J. H. Barnett, Marlin, Vice-President; Dr. E. P. Hutchings, Marlin, Secretary-Treasurer.

Grayson County Medical Society has elected Dr. D. K. Jamison, Denison, President; Dr. J. A. Rutledge, Denison, Vice-President; Dr. W. A. Lee, Denison, Secretary-Treasurer.

Hale-Floyd-Briscoe-Swisher County Medical Society has elected Dr. L. V. Smith, Floydada, President; Dr. C. C. Gidney, Plainview, Vice-President; Dr. E. Lee Dye, Plainview, Secretary-Treasurer.

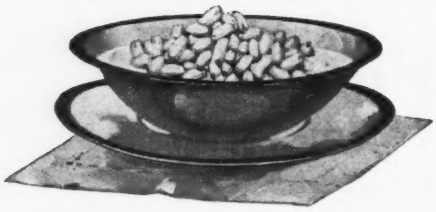
Hardeman-Cottle County Medical Society has elected Dr. James W. Conley, Quanah, President; Drs. T. A. Lowery, Chillicothe, and T. D. Frizzell, Quanah, Vice-Presidents; Dr. J. J. Hanna, Quanah, Secretary.

Harris County Medical Society has elected Dr. C. C. Green, Houston, President; Dr. F. O. Calaway, Houston, Vice-President; Dr. H. L. Bartlett, Houston, Secretary-Treasurer.

Hidalgo County Medical Society has elected Dr. G. W. Edgerton, Rio Grande, President; Dr. J. T. Caldwell, Mission, Vice-President; Dr. C. B. Buck, Mercedes, Secretary-Treasurer.

Hopkins County Medical Society has elected Dr. J. J. Dial, Sulphur Springs, President; Dr. W. E. Connor, Cumby,

(Continued on page 52)



Whole Grains

Steam Exploded

Quaker Puffed Grains are made by causing 125 million steam explosions in every kernel.

This breaks the food cells for easy digestion. The whole grain elements are supremely fitted to feed.

A dainty dish

Each flavory grain is an airy tid-bit puffed to 8 times its size. The terrific heat gives a rich nut-like taste that everybody likes.

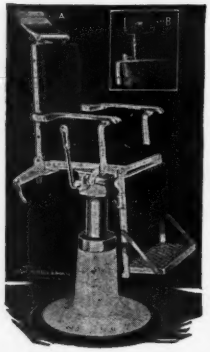
Children revel in Puffed Grains. Serve it morning, noon and night.

Puffed Rice is the confection of breakfast foods. Puffed Wheat in milk or half and half is an ideal way to serve whole wheat — an inviting dish at night.

Quaker Puffed Wheat

Quaker Puffed Rice

FOR THE DOCTOR'S OFFICE



The Lamb Treatment, Examining, Tonsillectomy Chair.

A beautiful chair, built for efficient service. Constructed of the finest materials and has many refinements not found on other chairs. Leg rest and back work in unison or separately.

Write for information and new Low Prices.

Just Press the Pedal—the lid lifts.

W. C. 141-b Waste Receptacle. White or grey enameled

$4.00

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Your Patient's Recreation

cannot accomplish its greatest good, if his nervous system is being subjected to the slightest irritation or depressing influence. Wearing

O'Sullivan's Heels

removes a source of irritation that, once unknown, is now recognized as an all too often factor in retarding convalescence — the repeated jarring of the body by walking with solid leather heels on hard unyielding floors and walks.

In ordering recreation and outdoor living for weak and convalescent patients, the aid that O'Sullivan's Heels will give should not be overlooked.

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can be effective only through the use of dependable endocrine products. The reputation and integrity of the manufacturer is the physician's only guarantee of reliability of those organotherapeutic products for which there is no chemical or biological assay. Every manufacturing process and all our product is supervised by our Analytical and Research Department.

DESICCATED PITUITARY BODY, U.S.P.	**EPINEPHRIN**
CORPUS LUTEUM	**EPINEPHRIN AMPULES**
CORPUS LUTEUM AMPULES	**SOLUTION OF EPINEPHRIN (1-1000)**
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insure potency and constancy of action by prescribing the products of

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Better Ocular Therapeutics

Can be obtained by the use of "M-E-S-Co" brand of Ophthalmic Ointments. **Reasons: Selected Chemicals, Thorough Trituration, Perfect Incorporation, Sterilized Tubes, Boiled and Strained Petrolatum, Excellent Service, No Waste, No Dirty Salve Jar, Right Prices.** Write for complete information.

MANHATTAN EYE SALVE CO., Inc.
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(Continued from page 50)

Vice-President; Dr. F. A. White, Sulphur Springs, Secretary-Treasurer.

Jack-Young County Medical Society has elected Dr. C. C. McClure, Jacksboro, President; Dr. W. O. Padgett, Graham, Vice-President; Dr. D. E. Winstead, Graham, Secretary-Treasurer.

Jones County Medical Society has elected Dr. J. F. Taylor, Hamlin, President; Dr. A. D. McReynolds, Stamford, Vice-President; Dr. A. McK. Jones, Anson, Secretary.

Milam County Medical Society has elected Dr. M. C. Sapp, Cameron, President; Dr. A. S. Epperson, Cameron, Vice-President; Dr. G. B. Taylor, Secretary-Treasurer.

Montague County Medical Society has elected Dr. W. W Davis, Nocona, President; Dr. E. E. Johnson, Montague, Vice-President; Dr. J. E. Smith, St. Jo, Secretary-Treasurer.

Tarrant County Medical Society has elected Dr. Edwin Davis, President; Dr. R. H. Gough, Vice-President; Dr. C. P. Hawkins, Secretary-Treasurer.

Taylor County Medical Society has elected Dr. Stewart Cooper, Abilene, President; Dr. J. H. Bailey, Clyde, Vice-President; Dr. M. E. Campbell, Abilene, Secretary-Treasurer.

Travis County Medical Society has elected Dr. N. R. Jackson, Manor, President; Dr. John C. Thomas, Austin, Vice-President; Dr. Dalton Richardson, Austin, Secretary.

Upshur County Medical Society has elected Dr. G. A. Taylor, Bettie, President; Dr. W. Hyde, Big Sandy, Vice-President; Dr. H. J. Childress, Gilmer, Secretary-Treasurer.

Van Zandt County Medical Society has elected Dr. Felix V. Bryant, Canton, President; Dr. Willard C. Hearin, Canton, Vice-President; Dr. D. Leon Sanders, Wills Point, Secretary-Treasurer.

The Texas State Medical Association announces the employment of Dr. D. R. Venable, Fort Worth, as an assistant to the Secretary-Editor, Dr. Holman Taylor.

The sixth annual course for water works and filter plant operators of Texas was held in Waco in January, under the auspices of the State Board of Health, the state and local water works association and the City Health Department. The purpose of the school is to decrease water-borne disease in smaller communities by training operators in approved methods of water purification.

(Continued on page 54)

Genito-Urinary Diseases

PROTARGOL

In acute and chronic gonorrhea Protargol is considered by many urologists an essential feature in the routine treatment. Acute cases respond quickly to weak solutions, which are well borne and economical.

ALYPIN

For local anesthesia of the genito-urinary tract in cystoscopy, instrumentation and operative work, Alypin has proved safe, prompt and efficient.

HELMITOL

Where an internal urinary antiseptic is required, as in cystitis, pyelitis and urethritis, Helmitol has been found to be agreeable of administration, excellently tolerated and satisfactory in effect.

Literature on Request

WINTHROP CHEMICAL COMPANY, Inc., 117 Hudson Street, New York, N. Y.

WINTHROP PRODUCTS
Conform to Original BAYER High Standards

Why Are Drugs Standardized?

They are standardized in order to bring about uniform therapeutic efficiency to the patient whenever required. This efficiency is most needed in the sick room—not merely in the laboratory.

What is true of drugs must be true of foods. Purity and efficiency in the can is only part of the problem—purity and efficiency in the kitchen is the true test.

The law requires that baking powder contain 12% of leavening gas at the time of sale to the consumer. This measure protects the health of the public.

In order to comply with this certain standard for baking powder, manufacturers must produce and pack their product so as to avoid deterioration which results from absorption of atmospheric moisture.

Baking Powder manufacturers to avoid violation of the law, spend thousands of dollars yearly in testing grocers' stocks and removing "spent" goods, in spite of the fact that every precaution is made against deterioration.

With the exception of Texas, the pure food laws are not applied to baking powder when mixed with flour at the mill and sold in bags as "Self Rising Flour." There is no penalty on the manufacturers if it fails to "self rise"—the customer is the "goat"—the one that pays the penalty through indigestion and ill health that comes from eating bakings that are not raised properly. The stardardization of baking powder is a protection to both consumer and manufacturer—he welcomes such laws and co-operates in every way possible.

Not so with the self rising flour manufacturer—he resents such laws and fights their legislation. Why? Because a standardization of self rising flour mixture would require moisture-proof containers instead of cheap sacks—because low grade "clears" could no longer be sold as "fancy patent flour." It would also mean expert chemical control by self rising flour manufacturers such as is now maintained by baking powder manufacturers.

You are interested in the impartial application of the laws—in the protection of the public health—do your duty by advocating such measures.

Calumet Baking Powder contains only such ingredients as have been officially approved by the U. S. Food Authorities. Packed in tin—keeps the strength in.

THE WONDERFUL
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equipped with our famous Sponge Rubber Pads for single or double inguinal or scrotal hernia can be depended upon to hold the most severe cases.

If your dealer cannot supply you, *send us his name* with your order or consult one of our personal service branches located as follows:

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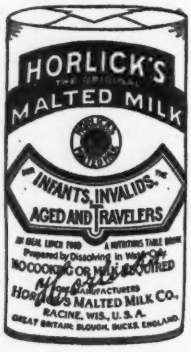
THE AKRON TRUSS CO., Akron, Ohio

Manufacturers of these famous Sponge Rubber Pad Trusses exclusively since 1904, for infants, youths and adults

Uniformly Reliable in the Dietetic Treatment of Your Patients

The Original



Avoid Imitations

Prescribed extensively because of its proved nutrient advantages.

(Continued from page 52)

The second annual Nutrition and Health Education Institute was held at the University of Texas, Austin, in February under the auspices of the Bureau of Extension.

The Quanah Sanitarium, owned by Drs. J. J. Hanna and R. R. McDaniel, was recently damaged by fire. The damage was covered by insurance and has been repaired.

Miss Edith Hershey, Head of the Division of Home Economics, University of Texas, Galveston, has been awarded the Medical Loan Scholarship of the General Federation of Women's Clubs.

Dr. William H. Beazley, Austin, State Health Officer, has resigned.

Dr. James Cary Pegues, Galveston, and Miss Virginia Thomson Scott, Atlanta, Ga., were married December 1.

Deaths

Dr. Frank Helton Morrical, Beaumont, aged 83, died December 4 from heart disease.

Dr. Matthew Mann Smith, Dallas, aged 59, died January 10 following a long illness.

Dr. Wilford Ervin Rucker, McKinney, aged 60, died January 5.

Dr. Robert W. McFerran, Childress, aged 52, died October 5 at Kansas City, Mo., while en route to Rochester, Minn., for treatment.

VIRGINIA

Petersburg Medical Society has elected Dr. D. D. Willcox, President; Drs. J. R. Beckwith and E. W. Young, Vice-Presidents; Dr. C. M. McCuiston, Corresponding Secretary; Dr. J. M. Harwood, re-elected Secretary-Treasurer.

The Seaboard Medical Society is making plans to purchase the birthplace of the late Dr. Walter Reed, which will be maintained as a memorial. Early in 1921 the Walter Reed Medical Society was organized as a memorial to Dr. Reed.

Deaths

Dr. Franklin Waters Hains, Petersburg, aged 59, died December 30 from heart disease.

Dr. Albert Chapman Lancaster, Fieldale, aged 48, died December 30 following a long illness.

Dr. Henry Dorrace Boyea, Ware Neck, aged 45, died recently.

WEST VIRGINIA

Harrison County Medical Society has elected Dr. C. R. Ogden, Clarksburg, President; Dr. J. E. Corbin, Clarksburg, Vice-President; Dr. C. O. Post, Clarksburg, Secretary; Dr. B. S. Drake, Treasurer.

Marshall County Medical Society has elected Dr. P. D. Barlow, President; Dr. O. P. Wilson, Treasurer.

Mercer County Medical Society has elected Dr. Joseph B. Kirk, Bluefield, President; Dr. Walter W. Harloe, Matoaka, Secretary.

Dr. Vinton A. Shelby has been appointed Full-time Health Officer of Harrison County.

Dr. Edward Jerald Van Liere, Morgantown, and Miss Helen Louise Kimmins, Wheeling, were married November 29.

Trade Mark Registered.
Gluten Flour
40% GLUTEN
Guaranteed to comply in all respects to standard requirements of U. S. Dept. of Agriculture.
Manufactured by
FARWELL & RHINES
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HIGH POWER
Electric Centrifuges
Send for IEE Cat. Cn
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LOESER'S INTRAVENOUS SOLUTIONS
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"Intravenous Solutions Need Not Be Isotonic"

(Loeser, Medical Review of Reviews, Jan. 24)

EVERY PHYSICIAN should read this article, in which the ultrascientific is converted into "plain told" facts of practical every day value.

EVERY PHYSICIAN should know the truth about the evolution of intravenous, isotonic, hypertonic and hypotonic solutions and osmotic pressure.

EVERY PHYSICIAN should be acquainted with that chapter of scientific history in which occurred the monumental work and collaboration of Arrhenius, Van't Hoff and Ostwald on solutions.

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Clinical Reports, Reprints, Price List, and The "Journal of Intravenous Therapy" will be sent to any physician on request.

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Producing ethical intravenous solutions for the medical profession exclusively

Are You Interested in Building Up An Office Practice?

In every county seat and in every city we can help one physician to build up $10,000 office practice.

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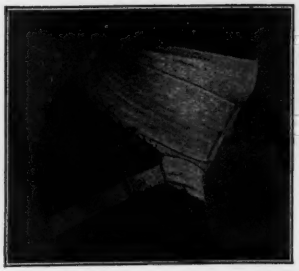

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